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# SESSIONAL PAPERS

VOL. XLVII.—PART IX.

FIRST SESSION

OF THE

## FOURTEENTH LEGISLATURE

OF THE

## PROVINCE OF ONTARIO

SESSION 1915

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No. 58 Whitson's Report of Northern Development Branch under 2 Geo. V., Cap. 2, for the year 1914. Presented to the Legislature, March 18th, 1915. *Printed.*

No. 59 Return to an Order of the House of the 22nd February, 1915, for a Return showing:—If any part of the 32,000 acres now being cleared, or about to be cleared, by the Government in the vicinity of Sudbury is to be set apart or used to give work to the unemployed. How many acres are to be so set aside, and what are the terms and conditions upon which the unemployed can secure work. Presented to the Legislature, March 8th, 1915. Mr. *Carter. Not Printed.*

No. 60 Report of the Honourable Mr. Justice Riddell, as representative of the Province of Ontario at the Ceremonies in the City of New Orleans held in Commemoration of the one hundredth anniversary of the Battle of New Orleans and of the one hundred years of peace which began with the end of that Battle. Presented to the Legislature, March 15th, 1915. *Printed.*

No. 61 Report of the Commissioner appointed to enquire into the financial affairs of the Village of Weston. Presented to the Legislature, March 15th, 1915. *Not Printed.*

No. 62 Return to an Order of the House of the 15th March, 1915, for a Return showing:—1. All correspondence between the Government or any officer or official thereof and Paul Morand, License Inspector for North Essex, in reference to the resignation or dismissal in the month of April, 1914, of the said Paul Morand as License Inspector for North Essex. 2. All correspondence and communications between the Government or any officer or official thereof and the said Paul Morand and any resident or residents of North Essex with reference to the re-appointment of the said Paul Morand as License Inspector in North Essex in the month of June, 1914, a few days before the election. Presented to the Legislature, March 15th, 1915. Mr. *Ducharme. Not Printed.*

No. 63 Agreement and Contract with Litho-Print, Limited, in connection with the Binding, etc., for the several Departments of Government. Presented to the Legislature, March 23rd, 1915. *Printed.*

No. 64 Return to an Order of the House of the 10th March, 1915, for a Return showing:—1. Copies of all petitions or requests received by the Government since the 1st day of January, 1914, from any Municipal Authority or Body in the Province in reference to the imposition of a tax upon automobiles, or as to the distribution of that tax or a portion thereof to the municipalities maintaining the roads. 2. Copies of all correspondence between the Government and any officer or official thereof and any Municipality of the Province, or any Automobile Association or Organization in reference to the said matter. Presented to the Legislature, March 17th, 1915. Mr. *Racine. Not Printed.*

No. 65 Return to an Address to His Honour the Lieutenant-Governor of the 11th March, 1915, for a Return of:—1. Copies of all Orders-in-Council and correspondence between the Government and any officer or official thereof and the Timiskaming and Northern Ontario Railway Company and any officer or official thereof in reference to the retirement of Frederick Dane as one of the Commissioners of the said Railway. 2. Copies of all Orders-in-Council and correspondence between the Government and

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No. 66 Return to an Order of the House of the 15th March, 1915, for a Return showing:—1. What officers have been appointed by the Workmen's Compensation Board under section 59 of the Workmen's Compensation Act. 2. What are the names, dates of appointment, and salaries of each officer so appointed. Presented to the Legislature, March 18th, 1915. Mr. *Carter. Not Printed.*

No. 67 Return to an Order of the House of 3rd March, 1915, for a Return showing:—1. All statements furnished by the Canada Copper Company, the International Nickel Company, the Mond Nickel Company and any other companies producing nickel, under section 8 of the Mining Tax Act respecting Taxation. 2. All reports from any Government mining assessor, made under the provisions of the Mining Taxation Act in respect of the mining operations of the Canada Copper Company, the International Nickel Company or the Mond Nickel Company, and particularly with reference to the royalties or taxes to be paid by the said Companies. 3. All correspondence between the Minister of Lands, Forests and Mines, or the Provincial Treasurer, or any officer or official of the Government and the Canada Copper Company, the International Nickel Company, the Mond Nickel Company and any other Companies producing nickel, with reference to the amount of royalties or taxes paid by the said Companies, or any of them, to the Provincial Treasury of the Province in respect of the ore mined or the mining operations carried on by them in the Province of Ontario. Presented to the Legislature, March 18th, 1915. Mr. *Carter. Not Printed.*

No. 68 Proceedings of the Second Annual Convention of the Association of Cemetery Officials of Canada. Presented to the Legislature, March 26th, 1915. *Not Printed.*

No. 69 Return to an Address of the 23rd day of March, 1915, praying for a Return shewing: 1. Copy of Order-in-Council dated 14th day of February, 1871, appropriating and transferring to the Government of the Province of Ontario the lands and property known as The Ontario Government House. 2. Copy of the Letters Patent dated the 15th day of January, 1908, declaring the said lands to have been transferred and appropriated for the use of the Provincial Legislature of the Province of Ontario within the meaning of the British North America Act, 1867. Presented to the Legislature 26th March, 1915. Mr. *Bowman. Not Printed.*

No. 70 Return to an Order of the House of the 25th March, 1915, for a Return showing:—1. How many convictions for violation of the Liquor License Law have been made for the electoral district for North Essex since the re-appointment of Paul Morand as License Inspector at the end of May, 1914. 2. Have Provincial officers or detectives been sent into this district since the 1st of June, 1914, to assist in securing enforcement of the law. 3. How many prosecutions have been instituted by, or at the instance of Provincial officers or detectives, and the said Paul Morand, respectively. Presented to the Legislature, March 29th, 1915. Mr. *Richardson*. *Not Printed.*

No. 71 Special Report on the Organization and Administration of the Hospitals for the Insane, Feeble-Minded and Epileptics and District Industrial Farms of the Province. Presented to the Legislature, March 29th, 1915. *Printed for distribution only.*

No. 72 Return to an Order of the House of the 24th March, 1915, for a Return showing:—1. What is the total number of the herd for dairy purposes now maintained by the Government at the Guelph Prison Farm. 2. How many of these were purchased and how many raised on the farm, respectively. 3. What was the total amount paid by the Government for the portion of the herd purchased by them. Presented to the Legislature, 31st March, 1915. Mr. *Ham*. *Not Printed.*

No. 73 Financial Statement of the Treasurer of Ontario. Presented to the Legislature, April 2nd, 1915. *Printed for distribution only.*

No. 74 Return to an Order of the House of 31st March, 1915, for a Return showing:—1. The number of English-French schools which have complied in the year 1914 with Regulation 17 of the Department of Education passed in the year 1913. 2. The number of English-French schools which have not complied with said Regulation 17 in the year 1914. 3. What English-French schools have received grants in the year 1914 under the Public Schools Act, and the amount thereof. 4. Copy of joint reports, if any, made by any inspectors pursuant to Regulation 17 and dated on or about May 23rd, 1913. 5. Copy of letters exchanged between ex-Inspector Henri Saint Jacques and the Department of Education or any officer or officers thereof with reference to the resignation of the said Henri Saint Jacques which are dated on or about the 18th October, 1913, and the 23rd October, 1913. Presented to the Legislature, April 2nd, 1915. Mr. *Mageau*. *Not Printed.*

No. 75 Return to an Order of the House of the 17th March, 1915, for a Return showing:—1. How many timber berths or locations have been sold since the 1st day of January, 1914. 2. Were all such berths or locations advertised for sale; if not, which ones were sold without advertisement. 3. If any were sold without

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No. 76 Telephone Systems, specifications, etc., as *per* Report of Ontario Railway and Municipal Board. Presented to the Legislature, April 2nd, 1915. *Printed.*

No. 77 Return to an Order of the House of the 28th April, 1914, for a Return showing:—1. If the Government granted the right to cut Pine or any other timber to Messrs. Foley Bros., Contractors, or to the Northern Construction Company, Limited, or to any person, firm or company in connection with the construction of the Canadian Northern Railway Company in the vicinity of Duchesne Lake, situate about 90 miles from the Town of Sudbury. 2. If so, to what persons, firms or companies were such permits made, and the dates of each. 3. What consideration did the Government receive with respect to each of the said permits, if any. 4. What Pine or other timber has been cut to date by each of the persons, firms or companies with respect to such permits. 5. How long was the right to cut to last and over what extent of land; and what were the other terms or conditions upon which such permits were made, if any. 6. What was the date of the completion of the construction of the Canadian Northern Railway at this point. 7. What amount of timber has been cut by any person, firm or company to whom such permit, as mentioned, has been made. 8. Is any person, firm or company at the present time cutting timber pursuant to such permit. Presented to the Legislature, April 2nd, 1915. Mr. *Richardson*. *Not Printed.*

No. 78 Return to an Order of the House of the 27th March, 1914, for a Return of:—All correspondence with reference to the resignation of Mr. Harkness, Manager, Superintendent of the Jordan Experimental Station. 2. The reports of the Committee or Advisory Board of the said farm for the years 1911, 1912 and 1913. 3. Statements showing the total expenditure to date divided between cost of building, cost of land, improvements of land and cost of management. Presented to the Legislature, April 2nd, 1915. Mr. *Anderson (Bruce.)* *Not Printed.*

No. 79 Return to an Order of the House of the 7th April, 1914, for a Return showing:—1. If the Lieutenant-Governor in Council made any arrangements under section 9 of the Succession Duties Act, with any part of the British Dominions, or with any

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No. 80 Return to an Order of the House of the 27th April, 1914, for a Return showing:—1. What consideration was paid by the licensee to the Government in respect of the issue of the original licenses respectively, of the territory included within the proposed agreement with the Pembroke Lumber Company. 2. How much was paid by the Pembroke Lumber Company for these licenses respectively at the date of the purchase thereof by them. 3. What amounts of pine, hemlock, cedar, spruce, hardwood and other timber respectively have been cut on the limits or areas covered by the proposed agreement and returned to the Department as so cut by the Pembroke Lumber Company in each of the years since the purchase thereof by them. Presented to the Legislature, April 2nd, 1915. Mr. *Bowman. Not Printed.*

No. 81 Statement on the distribution of the Revised and Sessional Statutes, up to 31st December, 1914. Presented to the Legislature, April 2nd, 1915. *Not Printed.*

# REPORT

OF THE

# Minister of Agriculture

## PROVINCE OF ONTARIO

FOR THE YEAR ENDING
OCTOBER 31, 1914

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1915

Interior of new dining-hall at the O. A. C., with seating capacity of 500.

# REPORT

OF THE

# Minister of Agriculture

## 1914

To His Honour John Strathearn Hendrie, C.V.O., *a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.*

*Lieutenant-Governor of the Province of Ontario.*

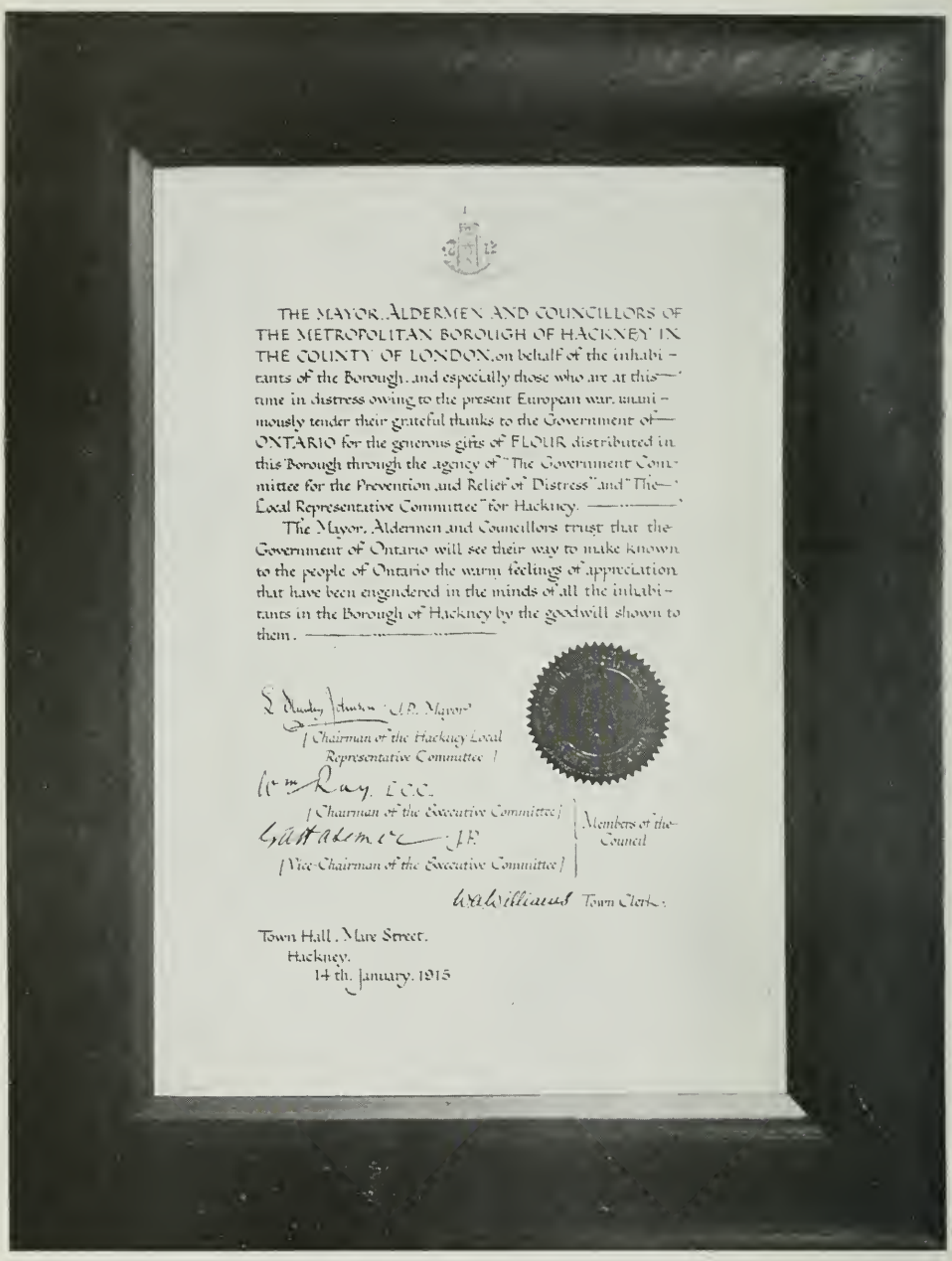
May it Please Your Honour:

I have the honour to submit the Annual Report of this Department for the year ending October 31, 1914.

Before attempting to review the work of the Department, it may be fitting to refer to the sudden and terrible outbreak of war which marked the closing months of that year. Agriculturally the Province was just entering upon a very promising harvest season when, almost without notice, the war cloud burst and the thoughts of all were diverted from the pursuits of peace to the realities of war. As we began to realize that it was not a thing of a week or a month, but a gigantic struggle in which the very life of this country was involved, we also began to realize that certain responsibilities rested on this country in the matter of foodstuffs. Situated so favourably geographically and blessed so bountifully by nature, this responsibility and opportunity had merely to be brought to the attention of the people to be at once recognized. Hence I took an early opportunity to issue through the press a statement somewhat as follows:—

"Within the next two weeks farmers of Ontario will be busy sowing fall wheat. I therefore would like through the press to urge every farmer to devote as large an acreage as possible to this crop this year, owing to the need that may exist because of the decrease in production in the countries of Europe now engaged in conflict, upon which Great Britain depends for a large portion of her supply. Ontario, of course, is not primarily a wheat Province, but I think an extra acreage might well be devoted to this crop under the present unprecedented circumstances. I recognize that the amount that can be sown this fall must be somewhat limited by the plans which have been made during the summer. At the same time I think special plans should be made to increase the acreage of the crops to be put in in the spring as well. There will undoubtedly be need for foodstuffs along many lines, in addition to wheat, such as potatoes, beans, oats, dairy products, live stock and poultry. I would like to point out that during the past season there were over 3,300,000 acres of land devoted to pasture. Now that there is every prospect of a good supply of labour, I think a great deal of this land could, with advantage, be broken up and put into crop. Aside from the question of price, it is undoubtedly the patriotic duty of every farmer to do his best to help in relieving the Mother Country from any occasion to worry over the food supply either of the men at the front or those at home. Incidentally it may also result in establishing trade connections which will be of great value long after the war is over. This can best be done by using as large an acreage as possible and by adopting the best methods of cultivation available. The Department is willing to do everything in its power to this end."

Advantage has been taken and is still being taken of every opportunity to emphasize the essential importance of this matter by every means within the power of the Department, through District Representatives, through the press, by meetings



THE MAYOR, ALDERMEN AND COUNCILLORS OF THE METROPOLITAN BOROUGH OF HACKNEY IN THE COUNTY OF LONDON, on behalf of the inhabitants of the Borough, and especially those who are at this time in distress owing to the present European war, unanimously tender their grateful thanks to the Government of ONTARIO for the generous gifts of FLOUR distributed in this Borough through the agency of "The Government Committee for the Prevention and Relief of Distress" and "The Local Representative Committee" for Hackney.

The Mayor, Aldermen and Councillors trust that the Government of Ontario will see their way to make known to the people of Ontario the warm feelings of appreciation that have been engendered in the minds of all the inhabitants in the Borough of Hackney by the goodwill shown to them.

S. Hadley Isaacs J.P. Mayor
[Chairman of the Hackney Local Representative Committee]

Wm Ray. L.C.C.
[Chairman of the Executive Committee]

G. Atkinson J.P.
[Vice-Chairman of the Executive Committee]

Members of the Council

W. A. Williams Town Clerk.

Town Hall, Mare Street,
Hackney.
14th. January. 1915

A framed resolution of gratitude which speaks for itself.

and in other ways. From reports and observation there is every reason to believe that the farmers are putting forth every effort and with favourable climatic conditions next year will see a record crop in this Province.

It also fell to this Department to look after the purchase and transportation of the gifts of flour and other foodstuffs which the Government, in the name of the people of Ontario, made to Great Britain and stricken Belgium. The first and most substantial gift consisted of 250,000 bags of flour, the evidence of the appreciation of which will be seen in the resolution on an adjoining page.

In my last Report I noted the agreement which had been entered into between this Department and the Federal Minister of Agriculture respecting the expenditure of moneys set aside from the Dominion Treasury for the encouragement of agricultural education. I am glad to say this plan continues to work admirably, and the money made available is proving of great advantage to the agricultural community. The agreement for the past year covered the following:

| | |
|---|---|
| District Representatives | $100,000 00 |
| O. A. C. Short Courses, travelling and living expenses of winners of Acre Profit and Live Stock Competitions | 1,500 00 |
| To encourage agriculture in the High and Public Schools, to be available for grants and for travelling and living expenses of teachers and others in attendance at Short Courses or other educational gatherings, in addition to services, expenses and equipment and to be paid out on recommendation of the Department of Education | 13,000 00 |
| Educational work in connection with marketing of farm products, including organization of co-operative societies, collection, printing and distribution of information on current prices and systems of marketing | 1,000 00 |
| Buildings at Ontario Agricultural College, including completion of buildings under construction | 72,000 00 |
| Stock and Seed Judging, Short Courses and Institute Lecture Work | 7,500 00 |
| Women's Institute Work, including courses in cooking, sewing, etc. | 7,500 00 |
| Short Courses for Fall Fair and Field Crop Judges, including travelling and living expenses | 1,500 00 |
| Drainage Work | 4,000 00 |
| Demonstrations and instruction in vegetable growing | 2,500 00 |
| Demonstration work on soils | 5,000 00 |
| Demonstration and instruction on live stock and poultry | 4,500 00 |
| Demonstration work in spraying, pruning and packing of fruits | 7,500 00 |
| Work in Bee-keeping | 1,000 00 |
| Lectures on horticulture | 500 00 |
| Miscellaneous | 1,868 83 |
| | $230,868 83 |

As these expenditures are supplementary to the provincial appropriations and are administered through the regular channels of the Department, further reference to the work will be found in the review of the work of the various Branches which follows.

# ONTARIO AGRICULTURAL COLLEGE

In spite of the unsettled conditions prevailing generally during the months immediately following the outbreak of war, it is pleasing to note that the interest and attendance at this institution were well maintained. The following figures tell their own story:—

STUDENTS OF THE YEAR.

| | | |
|---|---|---|
| General Course | 619 | |
| Specialists in General Course Work | 19 | |
| Manual Training (One Year Normal Course) | 7 | |
| Teachers' Courses (Agriculture and Horticulture) | 39 | |
| Dairy Course | 86 | |
| Stock and Seed Judging | 158 | |
| Poultry Raising | 40 | |
| Fruit Growing | 114 | |
| Agriculture | 87 | |
| | | 1,169 |

AT MACDONALD INSTITUTE.

| | | |
|---|---|---|
| Domestic Science | 274 | |
| Summer Courses—High School teachers | (13) | |
| Public School Teachers, first year | (63) | |
| Public School Teachers, second year | (32) | |
| | 108 | |
| | | 382 |
| Total | | 1,551 |

N.B.—There were also 140 children from the Guelph Public Schools who received instruction in Domestic Science at Macdonald Institute.

ANALYSIS OF COLLEGE ROLL (GENERAL COURSE), 1914.

*From Ontario.*

| | | | | | |
|---|---|---|---|---|---|
| Algoma | 6 | Huron | 9 | Peel | 10 |
| Brant | 28 | Kent | 9 | Perth | 9 |
| Bruce | 8 | Lambton | 16 | Peterboro | 6 |
| Carleton | 15 | Lanark | 4 | Prescott | 2 |
| Dufferin | 8 | Leeds | 5 | Rainy River | 1 |
| Dundas | 6 | Lennox | 5 | Renfrew | 3 |
| Durham | 10 | Lincoln | 17 | Russell | 2 |
| Elgin | 13 | Middlesex | 19 | Simcoe | 13 |
| Essex | 7 | Muskoka | 5 | Thunder Bay | 1 |
| Frontenac | 4 | New Ontario | 1 | Victoria | 1 |
| Glengarry | 3 | Nipissing | 4 | Victoria | 4 |
| Grenville | 5 | Norfolk | 18 | Waterloo | 14 |
| Grey | 7 | Northumberland | 11 | Welland | 6 |
| Haldimand | 8 | Ontario | 12 | Wellington | 35 |
| Halton | 9 | Oxford | 15 | Wentworth | 19 |
| Hastings | 3 | Parry Sound | 4 | York | 47 |

Total from Ontario .. 466

*From other Provinces of the Dominion.*

| | | | | | |
|---|---|---|---|---|---|
| Alberta | 14 | New Brunswick | 2 | Quebec | 4 |
| British Columbia | 28 | Nova Scotia | 14 | Saskatchewan | 6 |
| Manitoba | 5 | Prince Edward Island | 1 | | |

Total from other Provinces ..... 74

*From other Countries.*

| | | | | | |
|---|---|---|---|---|---|
| Argentine Republic .. | 1 | India ..... | 2 | Scotland ..... | 4 |
| B. W. Indies ..... | 3 | Japan ..... | 1 | South Africa ..... | 11 |
| England ..... | 27 | Mexico ..... | 1 | Spain ..... | 1 |
| Germany ..... | 1 | Newfoundland ..... | 1 | U. S. A. ..... | 23 |
| Ireland ..... | 2 | Russia ..... | 1 | | |
| | | | | Total from other countries ..... | 79 |

*Ages and Religious Denominations.*

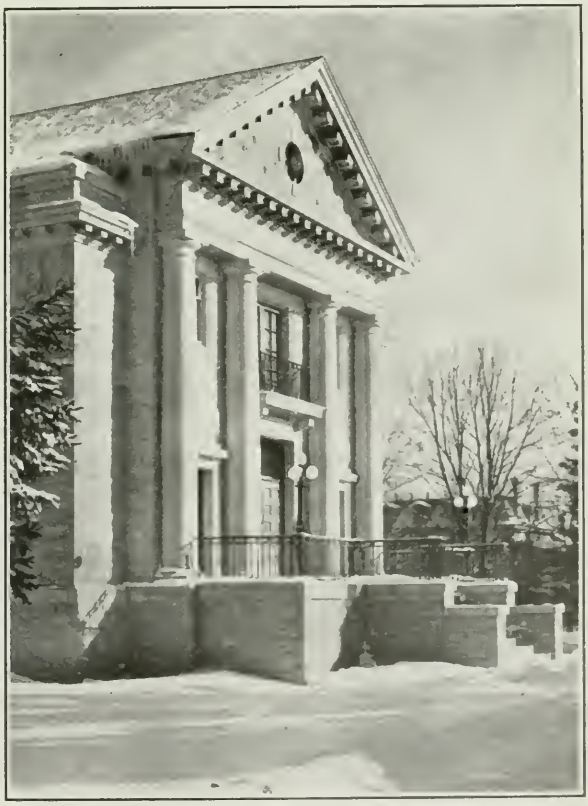
The limits of age in the General Course, 1913, ranged from 17 to 36 years. The average age was 22.

| | | | | | |
|---|---|---|---|---|---|
| Anglican ..... | 183 | Friends ..... | 5 | No Religion ..... | 2 |
| Baptist ..... | 21 | Jewish ..... | 1 | Presbyterian ..... | 171 |
| Christian Scientist .. | 1 | Latter Day Saints ... | 2 | Roman Catholic ..... | 19 |
| Congregational ..... | 12 | Lutheran ..... | 4 | Unitarian ..... | 1 |
| Dutch Reform ..... | 1 | Methodist ..... | 193 | United Brethren .... | 1 |
| Evang. Association ... | 2 | | | | |

Compared with the previous year the above figures show a decrease of just 9. Even this did not occur in the general Courses but is more than accounted for by the fact that a Short Course for Public School Inspectors held the previous year was not repeated last year. It is true that the freshman class entering in September was not as large as the record class of 225 of the year before, but with the exception of 1913 it was the largest on record. Another encouraging feature was the fact that the number included in the general Course from Ontario aggregated 466, as compared to 449 the previous year.

## MORE NEW BUILDINGS

Splendid progress was made during the year in the construction of new buildings. The most outstanding accomplishment in this regard was the completion of the new dining hall. Erected of grey stone, it is at once the most attractive and substantial building on the grounds. The interior finishings and equipment are plain but durable and the large dining room, planned to seat five hundred students, yet without pillar or post to obstruct the view or take up space, is without doubt one of the finest of its kind on the continent. It is not, of course, used to its maximum accommodation as yet owing to the limitations of dormitory accommodation, but with increases in this respect.



Entrance to the new dining-hall.

such as are anticipated within the next few years, it will prove a great acquisition to the College equipment.

The new poultry building has also been completed, and in its facilities for class room and laboratory work and its accommodation for meetings and conventions, it is proving a great boon to this department, which is ever growing in importance.

A start has been made on another substantial building for the Physics Department and it is expected this will be ready for the opening of next term.

## MACDONALD INSTITUTE

The girls' section of the College work continues in interest and popularity. The attendance is only limited by the accommodation, as will be noted from the figures quoted above. While the main business of the institution is and should be to train girls for their life work in the home, its graduates are not infrequently called upon to fill professional positions in domestic science work. In addition it is being looked to for assistance more and more by those engaged in Women's Institute and kindred work. The following list of requests will give an idea of its usefulness along these lines:—

| | |
|---|---|
| Home Interests | 99 |
| House and Housekeeping | 117 |
| Food and Cookery | 125 |
| Dietetics | 15 |
| Health | 57 |
| Household Finance | 30 |
| Education, Home Economics and General | 44 |
| Clubs, Social Service, etc. | 176 |
| Gardening and Agriculture | 35 |
| Miscellaneous | 43 |
| Total | 741 |

## O.A.C. No. 72 OATS STILL AT THE FRONT

As usual, exhaustive work has been done by the Field Husbandry Department in the testing of cereal, hay, and root crops. The results are being issued in bulletin form and should be studied and kept for reference by every farmer.

General view of the O. A. C. Experimental Plots.

In the meantime it may be briefly noted that O. A. C. No. 72 oats is still at the front in all tests and promises to duplicate the success of O. A. C. No. 21 barley. If this proves to be the case it will be of inestimable value to the Province, for at present there are a large number of varieties being used in different sections, and the need of standardization is very great. Along with No. 72 is being tried out an earlier variety, O. A. C. No. 3, which is also giving excellent results in its class. The following figures for eight years tests on the College plots are important:—

| Varieties. | Days to Mature. | Per Cent. Hull. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | Av. |
| Early Varieties: | | | | | | | | | | |
| Daubeney..... | 102 | 24.7 | 23.3 | 25.4 | 24.9 | 26.2 | 24.6 | 24.5 | 25.9 | **25.0** |
| O. A. C. No. 3.. | 100 | 24.7 | 23.6 | 24.8 | 24.4 | 25.0 | 23.8 | 23.0 | 24.3 | **24.2** |
| Late Varieties : | | | | | | | | | | |
| Banner ..... | 110 | 28.3 | 28.6 | 29.6 | 29.6 | 31.3 | 35.5 | 29.2 | 30.7 | **30.4** |
| O. A. C. No. 72.. | 110 | 27.2 | 25.4 | 28.7 | 28.6 | 27.8 | 28.0 | 25.6 | 28.9 | **27.5** |

| Varieties. | Yield of Straw per acre. Tons. | Yield of Grain per acre (bushels). | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | Av. |
| Early Varieties: | | | | | | | | | | |
| Daubeney ..... | **1.70** | 80.79 | 88.97 | 98.35 | 87.00 | 42.12 | 76.47 | 60.41 | 63.88 | **74.75** |
| O. A. C. No. 3 .. | **1.73** | 86.29 | 89.24 | 104.88 | 90.35 | 49.76 | 91.65 | 94.12 | 57.53 | **82.98** |
| Late Varieties : | | | | | | | | | | |
| Banner ..... | **1.94** | 65.94 | 83.50 | 70.41 | 73.62 | 30.41 | 73.44 | 74.38 | 88.00 | **69.96** |
| O. A. C. No. 72.. | **2.16** | 76.38 | 86.92 | 102.94 | 93.59 | 43.97 | 114.12 | 105.74 | 88.50 | **89.01** |

The results at the College have been confirmed by the experience of others who have tried these varieties on their own farms. As a consequence the seed is now in great demand.

## RAVAGES OF THE ARMY WORM

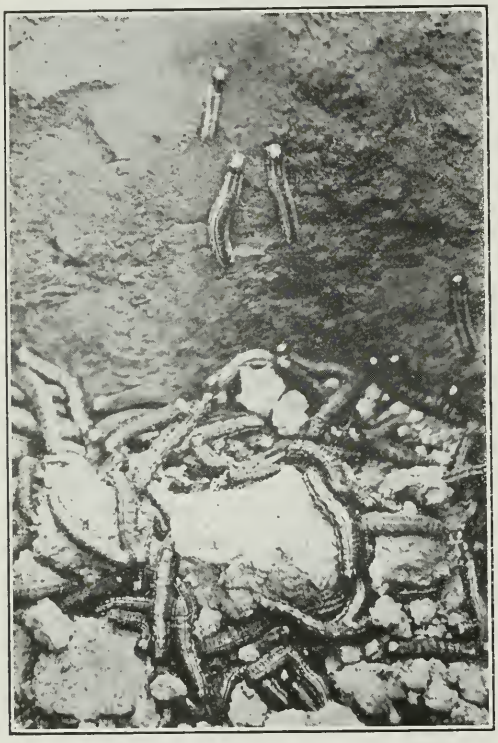
The College had a splendid opportunity to render a distinct service to the farmers of the Province during the summer on account of the serious invasion of the Army Worm almost all over the Province.

The first report of the outbreak came into my office on July 14th, and the Department of Entomology at the College was immediately instructed to investigate and assist. Shortly after an outbreak was discovered on the College farm, and it soon became evident that the outbreak was pretty general and every available man at the College spent several weeks co-operating with the District Representatives and the farmers in checking the invasion and keeping the damage as low as possible. Digging of trenches and scattering poisoned bran proved two of the most effective methods in this regard.

An examination of the records reveals the fact that the last serious outbreak of this kind occurred in 1896. At that time it was reported from 39 Counties and 118 Townships; in 1914 it was reported from 42 Counties or Districts and 234 Townships. There was a considerable similarity in the distribution of these two widely separated outbreaks, but a notable exception was Brant County, which apparently escaped in 1896, and was the start and chief sufferer in 1914.

Although further reference is made to this outbreak in the review of the work of the District Representatives, it may be in order to place on record here a summary showing the general nature of the outbreak, prepared by the Lecturer in Entomology from personal observation and from reports received from District Representatives and other sources.

*Essex County.*—General in distribution throughout the county, but serious damage only in three or four districts. Greatest injury to oats, but because of heavy crop county yield probably about normal. Reported from the following townships: Anderdon, Colchester North, Colchester South, Gosfield North, Mersea, Malden, Pelee, Rochester, Sandwich South.



Army worms in a trench.

*Kent County.*—General in distribution, but serious damage confined to small areas. Reported from following townships: Camden, Chatham, Dover, Harwich, Howard, Romney, Tilbury East, Zone.

*Lambton County.*—Extensive in distribution. Greatest injury to oats. Over half crops destroyed on forty or fifty acres—less than half on 1,000-2,000 acres. Also light infestation in various small areas. Reported from following townships: Brooke, Dawn, Enniskillen, Moore, Plympton, Sarnia.

*Elgin County.*—General in distribution. Greatest injury to oats. Serious loss in only a few small districts. Reported from following townships: Aldborough, Bayham, Dorchester South, Dunwich, Malahide, Southwold, Yarmouth.

*Middlesex County.*—General in distribution. Most extensive outbreak in Nissouri township, and here greatest damage to pasture. Outbreaks on individual farms in other townships with chief damage to oats. Reported from following townships: Biddulph, Caradoc, Delaware, Dorchester, Ekfrid, London, Mosa, Nissouri West, Westminster.

*Huron County.*—General in distribution. Serious damage restricted to small areas. Reported from following townships: Ashfield, Colborne, Grey, Hay, McKillop, Morris, Tuckersmith, Usborne, Wawanosh.

*Bruce County.*—General in distribution. Damage not serious. Only two fields completely destroyed. Reported from following townships: Amabel, Albermarle, Arran, Brant, Carrick, Culross, Eastnor, Elderslie, Greenock, Huron, Saugeen.

*Perth County.*—Extensive occurrence only on one farm; chief damage to pasture. Reported from following townships: Blanshard, Downie, Ellice.

*Norfolk County.*—General in distribution and extensive damage, especially in northern part of county. Reported from following townships: Charlotteville, Middleton, Townsend, Walsingham, Windham, Woodhouse.

*Oxford County.*—General in distribution. Extensive injury in four large areas and numerous small ones. Great damage, especially to pasture. Reported from following townships: Blandford, Blenheim, Dereham, Nissouri East, Norwich North, Oxford East, Oxford North, Oxford West, Zorra East, Zorra West.

*Waterloo County.*—Serious damage only in few areas. 2,000 acres largest area. Reported from following townships: North Dumfries, Waterloo, Wilmot, Woolwich.

*Wellington County.*—General in distribution. Injury only in small areas. Greatest damage to oats. Reported from following townships: Eramosa, Guelph, Nichol, Puslinch, West Garafraxa, West Luther.

*Grey County.*—General in distribution, but damage comparatively slight. Reported from following townships: Derby, Egremont, Glenelg, Keppel, Proton, Sullivan, Sydenham.

*Dufferin County.*—Limited in distribution. Areas of infestation small. Reported from following townships: Amaranth, East Garafraxa, Melancthon.

A sheaf of oats after the army worm had visited them.

*Simcoe County.*—General in distribution. Greatest injury to late oats and corn. Damage to other crops not over 10 per cent. in infested areas. Reported from following townships: Flos, Innisfil, Orillia, Sunnidale, Tecumseh, Tiny, Vespra.

*Peel County.*—Most serious in Toronto Gore township. Greatest damage to oats. Reported from following townships: Chinguacousy, Toronto, Toronto Gore.

*Halton County.*—General in distribution, but chief damage in a few limited areas. Reported from following townships: Nelson and Trafalgar.

*Wentworth County.*—General in distribution. Damage not extensive. Most serious in pastures. Reported from following townships: Ancaster, Barton, Beverley, Binbrook, Flamboro East, Flamboro West, Glanford, Saltfleet.

*Brant County.*—General in distribution. Infestation over large areas. Greatest loss to pastures but also extensive damage to timothy, oats, and corn. Reported from following townships: Brantford, Burford, Dumfries South, Oakland, Onondaga, Tuscarora.

*Haldimand County.*—General in distribution. Infested areas small. Greatest injury to green oats. Reported from following townships: Cayuga North, Dunn, Moulton, Oneida, Rainham, Seneca, Walpole.

*Welland County.*—General in southern half of county. Serious only in a few small areas. Reported from following townships: Bertie, Humberstone, Stamford, Thorold, Wainfleet.

*Lincoln County.*—Limited in distribution. Damage not extensive. Reported from following townships: Grantham and Niagara.

*York County.*—General in distribution. Damage extensive over considerable areas. Reported from following townships: East Gwillimbury, King, Markham, Scarboro, Vaughan, Whitchurch.

*Ontario County.*—General in distribution. Considerable damage to grain crops and loss in pasture extensive. Reported from following townships: Mara, Pickering, Reach, Thorah, Uxbridge, Whitby.

*Durham County.*—Limited to a few small areas. Damage slight. Reported from following townships: Clarke, Darlington and Hope.

*Victoria County.*—General in distribution. Present on most of farms of county but damage slight on most. Reported from following townships: Eldon, Emily, Fenelon, Laxton, Mariposa, Ops, Verulam.

*Northumberland County.*—General in distribution. Damage not extensive. Corn and oats attacked, but chief injury to pasture. Reported from following townships: Brighton, Haldimand, Hamilton, Murray, Seymour.

*Peterboro County.*—General in distribution. Damage not extensive over large areas. Reported from following townships: Dummer, Galway, Otonabee, Smith.

*Muskoka District.*—Extensive in distribution. Damage considerable over large areas. Injury to timothy, oats and corn. Reported from following townships: Chaffey, Draper, Macaulay, Monck, Stisted.

*Parry Sound District.*—Extensive in distribution. Damage over considerable areas. Reported from following townships: Armour, Hagerman, Himsworth, McMurrich, Ryerson.

*Nipissing District.*—Chief occurrence in small isolated areas. Damage not extensive. Reported from following townships: Chisholm, Glackmeyer, Lamarche, Maisonville, Papineau, Springer.

*Temiskaming District.*—Distribution general wherever much clearing. Damage not extensive. Reported from following townships: Armstrong, Dack, Dymond, Evanturel, Harley, Hilliard, Henwood, Hudson, Ingram, Kerns, Marter, Whitney.

*Algoma District.*—Most extensive occurrence over 500 acres in Bar River settlement. Also in neighbourhood of Sault Ste. Marie. Injury to timothy. Reported from following townships: Korah, Laird, Macdonald, Tarentorus.

*Manitoulin District.*—Injury only in three localities. Chief damage on 100 acres in Carnarvon township. Reported from following townships: Assignack, Barrie Island, Carnarvon.

Note the damage done in a corn field by the army worm.

*Grenville County.*—No appreciable damage. Reported in small numbers in one locality of the township of Edwardsburg.

*Hastings County.*—General in distribution. Chief injury to new seeding. Little done towards control. Reported from following townships: Madoc, Rawdon, Sidney, Thurlow, Tyendinaga.

*Prince Edward County.*—General in distribution. Damage extensive, especially to pasture and corn. Reported from following townships: Ameliasburg, Athol, Hallowell, Hillier, Marysburg, Sophiasburg.

*Lennox County.*—General in distribution. Damage extensive, especially to corn. Reported from following townships: Adolphustown, Ernesttown, Fredericksburg North, Fredericksburg South, Kaladar, Richmond.

*Renfrew County.*—Chief occurrence in south-western part of county. Considerable damage in small areas. Greatest injury to barley. Reported from following townships: Admaston, Alice, Bromley, Horton, Ross, Westmeath.

*Leeds County.*—No appreciable damage. Reported in small numbers in one locality of the township of Lansdowne.

*Lanark County.*—Occurrence only in two small areas. Chief damage to pasture. Reported from following townships: Pakenham and Sherbrooke South.

*Carleton County.*—Occurrence only in northern part of county. Chief damage to oats. Reported from following townships: Fitzroy, Huntley, Torbolton.

The above records of distribution refer only to areas where Army Worms were present in sufficient numbers to do any real or appreciable damage. The pest was general in distribution throughout Old Ontario, with the exception of the counties in the eastern peninsula. The most northerly record was near Cochrane, and the most westerly in the neighbourhood of Sault Ste. Marie, Algoma district.

## LIVE STOCK DEPARTMENT STRENGTHENED

With the addition of a lecturer to the teaching staff and the purchase of new stock, the Live Stock Department has been materially strengthened. The new stock purchased consisted mainly of three imported Ayrshire heifers and a very high class imported bull. These animals have been much admired by stockmen, especially in Ayrshire breeders, whose favourites are now fittingly represented in the College herd.

The imported Dairy Shorthorns are showing satisfactory returns at the pail. The best cow gave over 11,000 lbs. of milk during her period of lactation, while four cows averaged 8,600 lbs. during their period.

For 30 cows, including heifers, in the dairy herd, the average was 9,131 lbs. This included 15 Holstein cows, which averaged 11,367 lbs.

Some important investigational work in feeding is now in hand and may prove subject matter for bulletins when completed. Two points may be noted:—

Comparisons of mixed meal made up of barley, wheat and oats with molasses meal, and of oil cake with molasses meal, have resulted to the disadvantage of the molasses preparations.

For fattening steers, alfalfa hay was compared with timothy hay. The steers consumed more alfalfa hay than timothy hay, but required less meal for 100 pounds of gain. Alfalfa hay, therefore, has proved itself valuable for fattening purposes as well as for milk production.

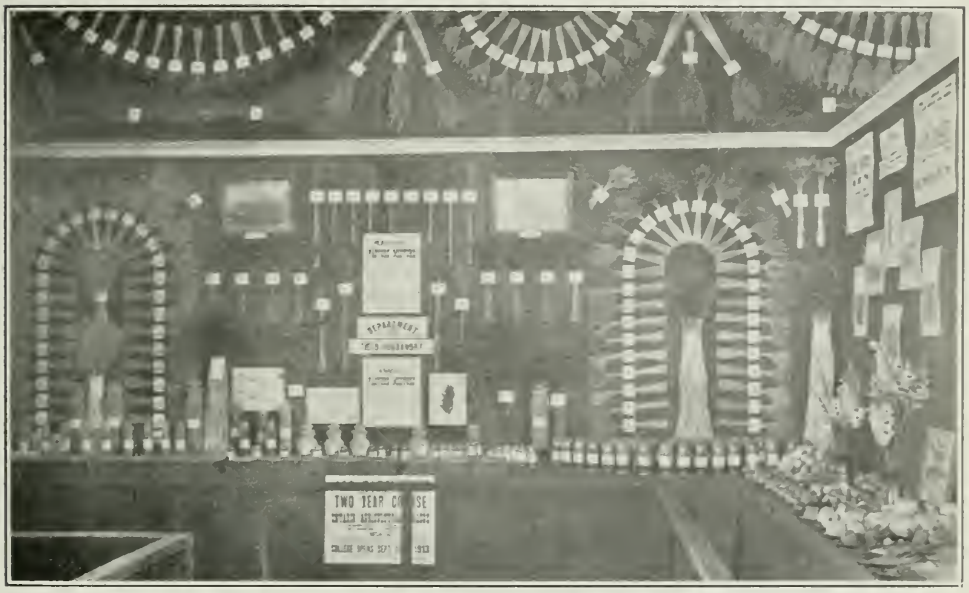
Work with dairy cows was started to study the relative values of some of the common home-grown grains, wheat, barley and oats being used.

So far as milk production is concerned wheat produced the most milk per hundred pounds, barley came next, and oats followed very close. The work, however, will be carried further.

## AUCTION SALE OF COLLEGE STOCK

Each year the College has some purebred surplus stock to dispose of, and this year it was decided the best way to dispose of it was by auction. The result proved very satisfactory. Everyone so desiring was given an equal opportunity to secure this highly desirable stock for their herds. The list offered included cattle, sheep and swine, and on the whole good prices prevailed. The feature price was 13c. per lb. paid for a fine bunch of steers on the hoof.

Another interesting feature was the sale of a ten months' lease of the splendid imported English milking shorthorn bull. Leasehold is not an uncommon method of handling sires in Great Britain, but it is rarely adopted here. When the herd of Milking Shorthorns were imported a year or so ago two bulls were included among the number. As the College had no immediate use for one, but would need him a year hence, it was decided that he should be used in the meantime to improve the stock in some section. Hence a ten months' lease was offered by auction and it aroused very keen competition, being finally sold for $125. The sale altogether brought in over $1,000.




Part of the O. A. C. Exhibit at the Canadian National.

## WORK IN SEED INOCULATION

Through the Bacteriological Department a total of 3,467 cultures of legume bacteria, each culture sufficient for one bushel of seed, were distributed for various seeds as follows:—

Alfalfa, 2,763; red clover, 407; alsike clover, vetches, sweet peas, peas, beans, white clover, sweet clover, crimson clover, 297.

The distribution of alfalfa cultures by Provinces is as follows:—

Ontario, 1,621; British Columbia, 689; Saskatchewan, 241; Alberta, 133; other Provinces, 79.

As heretofore, blank reports were sent to recipients of cultures asking for the results of their seed inoculation, and data compiled from the reports returned show the inoculation beneficial to the crop in 79.7 per cent. of cases. No returns have yet been received from the 430 alfalfa cultures sent to the British Columbia Department of Agriculture for distribution among farmers of that Province.

### ARE OUR PINE TREES IN DANGER?

Another serious disease which has been discovered for the first time is known as European Currant Rust and White Pine Blister Rust. The Currant Rust was first found on the College farm. An investigation which followed showed it to be scattered through the Niagara District. The peculiar nature of the Currant Rust is such that it produces the disease on White Pine trees known as Blister Rust. In some parts of Europe it has been so serious that it has almost completely destroyed the white pines, and its spread in Ontario would cause great loss. Everything possible, therefore, is being done to prevent it becoming established here, and the Departments of Botany and Entomology are working in co-operation with the Provincial Forester and the Federal authorities.

### MANY SOILS NEED LIME

One of the most important subjects now demanding attention is that of soil fertility, and this is now receiving a great deal of attention from the Chemistry Department. Preliminary work has been carried on with a view to demonstrating the needs of certain types of soil thought to be deficient in fertility. Sand areas have been studied and samples of muck soils analysed in the laboratory. This work will be pushed energetically during the coming season. In the meantime the Professor of Chemistry has this to say:—

"Our study in soils so far has shown us clearly that there are considerable areas of soils, especially in the older settled parts of the Province, deficient in lime, and I feel sure that in many cases this is the cause of the poor catch of clover. In looking around for a cheap source of lime we find that we can get the fine dust screenings from the stone crusher for practically what it costs to load the material. This material has been a waste product in the past, and we have hopes that it will prove a satisfactory source of lime to sour soils. In connection with this work we have arranged for the application of six car loads. In some cases this has been applied in conjunction with fresh burned lime and gypsum. We are expecting some very interesting results from this work. I feel fully convinced that the judicious use of lime on some of our clay soils and also on some of our sandy soils will make a very marked difference to the productiveness of the soil."

### DRAINAGE DEMONSTRATION PLOTS

The new feature of the drainage work carried on under the Professor of Physics has been the demonstration plots. These, it will be recalled, were started in sections where the practicability of drainage was doubted and where little or no drainage had been done. A field was secured, half drained and the other half left undrained. Prior to 1914 eight of these had been started, and the first reports show an average increase of $14.12 per acre. In this connection it should be remembered that the season of 1914 was one of the driest on record, showing that drains have a high value even in dry weather. The following table tells the story, the value being computed on the folowing basis: Oats, 62c. per bushel; barley, 63c.; wheat, $1.05; straw, $6 per ton.

| Name and Address | Kind of Soil. | Crop. | Difference in dates of seeding. | Yield Bushels. | | Gain by draining. | | Value of increase in grain & straw |
|---|---|---|---|---|---|---|---|---|
| | | | | Undrained. | Drained. | Bush. of Grain. | Tons of Straw | |
| Neil McDougald, Tara | Clay loam | Fall Wheat | ..... | 11¼ | 29¾ | 18½ | .785 | $24 05 |
| Albert Snell, Hagersville | Heavy clay | Barley | 0 | 27½ | 38 | 10½ | .264 | 8 19 |
| Harry Hunter, Napanee | Clay | Oats | 11 | 12¾ | 28¾ | 16 | .500 | 12 92 |
| Beecher Matchett, Peterboro | Loam | " | 7 | 31½ | 67¼ | 35¾ | .750 | 26 66 |
| Walter Carson, Dundalk | " | " | 11 | 30.6 | 40.6 | 10 | .333 | 8 20 |
| A. N. Lapum, Centreville | Muck | " | Never sowed before | | | 28 | 1.20 | 24 56 |
| Sandy Matchett, Peterboro | Heavy clay | Mixed grain | 7 | 923 lbs | 1433 lbs | 510 lbs | .333 | 8 37 |
| Stephen Culver, Selkirk | No appreciable difference in crop. | | | | | | | |

Average increase due to drainage, including Stephen Culver's plot.....$14.12

Already these demonstrations are having the effect of encouraging draining, and in one neighbourhood alone two carloads of tile were laid last fall by the farmers themselves. During 1914 nine more of these plots were installed and further interesting results may be expected next year.

A Drainage Demonstration.

## EVERY ENCOURAGEMENT FOR DRAINAGE

In the meantime the other work of making surveys and holding demonstrations in ditching and tile laying has been carried on with energy. The following table shows the growth of this work from its inception:—

| Year. | Appropriation. | Application. | Surveys. | Applications held over. | Acres surveyed. | Miles of drain. | Demonstrations. | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | No. | Average attendance. |
| 1906..... | Nil | 15 | 15 | ..... | 500 | 45 | ..... | ..... |
| 1907..... | Nil | 126 | 70 | 56 | 3,500 | 350 | ..... | ..... |
| 1908..... | $1,000 | 166 | 100 | 66 | 5,000 | 510 | 43 | ..... |
| 1909..... | 1,000 | 302 | 179 | 121 | 5,157 | 613 | 48 | 18.0 |
| 1910..... | 4,000 | 518 | 383 | 135 | 14,672 | 1,800 | 132 | 23.6 |
| 1911..... | 4,000 | 414 | 327 | 87 | 15,211 | 1,864 | 142 | 17.4 |
| 1912..... | 4,000 | 430 | 293 | 137 | 17,212 | 2,278 | 70 | 21.7 |
| 1913..... | 4,000 | 290 | 247 | 43 | 13,705 | 1,713 | 56 | 20.3 |
| 1914..... | 4,000 | 296 | 250 | 46 | 13,386 | 1,673 | 23 | 20.9 |
| Totals.... | ..... | ..... | 1,864 | ..... | 88,343 | 10,846 | 514 | ..... |

Showing a splendid crop grown on drained land where little or nothing grew before.

In addition to the work of the College staff proper, a considerable portion of the time of District Representatives is taken up in making surveys, and there is no doubt thousands of acres are drained indirectly as well as directly under this influence. With a system by which money may be borrowed from the Government through Township Councils for drainage, and with experts to make surveys and draw plans free of charge for the farmer upon request, it must be admitted every possible encouragement is being given by the Government to drainage.

## EXPERIMENTS IN FRUIT GROWING

Under the direction of the Pomology Department a very important series of experiments have been inaugurated dealing with the following points among others:—

To determine whether Snow and MacIntosh Red would pollenize each other satisfactorily;

To determine whether summer pruning will hasten the bearing period of Northern Spy trees;

To determine whether it would be practicable to top graft Ben Davis to other varieties.

Some progress has been made but further work will be necessary to justify absolute conclusions.

Attention has also been paid to winter injury to fruit trees, a cause to which is attributed the loss of thousands of trees throughout the Province. On this subject the following conclusions have been reached:—

1. The forms of winter injury which are most common at the present time are root killing and bark splitting on the trunk.

2. Much injury of both types occurs through cultivating late, or otherwise forcing growth of trees.

3. Much root killing occurs through the absence of windbreaks and the absence of snow covering during winter. Root killing is much more common on wind-swept knolls and on ground bare of vegetation.

4. Root killing is much more common in the southern parts of the Province where snowfall is scanty, than in the north, or rather in the districts where snowfall is more abundant.

5. The stocks used by our nurserymen are not hardy enough for Ontario conditions. We find numerous cases in apples, pears, plums and cherries (all of which are budded or grafted) where the trunk is sound down to the point of union, which is usually at or slightly below ground level. It is very common to find the injury entirely confined to the portions lying below the point of budding or grafting.

6. A great deal of root killing may be avoided by using cover crops and other means of checking fall growth of trees. Late cultivation is especially to be avoided.

7. Experiments are now under way at the O. A. C. to determine the extent to which cover crops and certain methods of soil treatment may be made use of in order to prevent deep freezing of orchard soils.

## CONTROLLING WEEDS

Co-operative experiments in weed eradication have been conducted now for three years under the Professor of Botany. The object of this work is to have carried on by men on their own farms experiments in the eradication of weeds, the results of which will furnish data from which definite statements may be made regarding the best methods of controlling the various injurious weeds. Five experiments in all have been tried: The use of rape in the destruction of Perennial Sow Thistle; the use of rape in the destruction of Twitch Grass; a method of cultivation and cropping for the destruction of Twitch Grass; method of cultivation for the eradication of Bladder Campion or Cow Bell; spraying with Iron Sulphate to destroy Mustard in Cereal Crops.

During the past three years some forty-eight farmers co-operated in this work, including seven District Representatives. The reports received of these co-operative experiments indicate:

First, that good cultivation followed by rape sown in drills provides a means of eradicating both Perennial Sow Thistle and Twitch Grass; second, that rape is a much more satisfactory crop to use in the destruction of Twitch Grass than buckwheat; third, that thorough, deep cultivation in fall and spring followed by a well-cared-for hoed crop, especially corn, will destroy Bladder Campion; fourth,

that Mustard may be destroyed in oats, wheat and barley by spraying with a twenty per cent. solution if iron sulphate without any serious injury to the standing crop.

Points of interest brought out by the experiments in spraying with Iron Sulphate to destroy Mustard were:—

1. The necessity of spraying early, just when the plants are coming into bloom. If the spraying is left too late, the older plants will not be destroyed by the solution and will form seed, and hence the experiment will not be entirely satisfactory.

2. To spray thoroughly and with a good pressure. In order to spray thoroughly with an ordinary broadcast attachment it is necessary to keep the horses walking very slowly. If an attempt is made to cover the ground quickly, some of the plants will be missed, and the results will not be satisfactory.

3. In regard to the cost of spraying with Iron Sulphate, it was found that the cost of material per acre varied from $1.00 to $2.40. If the Iron Sulphate is bought wholesale, it can be purchased at $1.00 per cwt., so that $1.50 to $2.50 per acre should cover the entire cost of spraying.

## NEW DISEASES ON ONIONS

The Botany Department has also had reported to it for the first time as occurring in this Province a disease known as Onion Smut. This is regarded as a most persistent and destructive disease, and onion growers are warned against allowing it to become prevalent. The following facts in reference to it by the Professor of Botany may aid in this regard:—

Onion Smut attacks onions grown from seed. It destroys many of the seedlings shortly after they appear above the ground. The diseased seedlings, which are not completely killed in the early stage, are so severely injured that they die later or produce small misshapen bulbs. The disease also appears on mature bulbs in the fall. Affected leaves are enlarged and often distorted and dark in color with black streaks. If they are broken, they are found to be filled with a black, powdery mass, which is composed of the spores of the fungus. Black masses of these smut spores are also found on the bulbs. The spores winter over in the soil, hence the danger of planting onions on smut infected soil. The disease is not, as generally supposed, disseminated to any great extent on the seed. It may, however, be carried long distances on the bulbs.

Treatment: 1. Transplanting. If the soil is infested with smut, grow the seedlings on smut free soil, then transplant. This is a certain preventive, but involves considerable labor. 2. Rotation of crops will reduce considerably the amount of smut. 3. Drill into the rows when planting the seed 100 lbs. sulphur mixed with 50 lbs. lime per acre. Such applications have been found to greatly reduce the amount of smut. Lime and sulphur sown broadcast are not effective.

## SWEET CLOVER

The Chemistry Department has been devoting some study to the subject of Sweet Clover. This plant so long regarded as a weed by many has recently received a great deal of attention in many sections of the Province as well as in many states across the line. An effort is being made therefore to get some authoritative light on the question as to just what place it should occupy in agriculture. As a preliminary an effort was made to ascertain the extent to which it is already being grown in the Province. This revealed the fact that there are quite a number of farmers in various sections who have given it a place on their farms. In most

cases they speak very highly of it. In the first place, of course, they have no difficulty getting a catch, and they also claim that if cut before it becomes too fibrous it is relished by the stock. There is nothing to prove that it should be given precedence over alfalfa or clover where a good stand of these can be secured, but it may have a usefulness on rougher lands. In the meantime the Chemistry Department is carrying on experiments to determine its digestibility, etc.

## AGRICULTURE IN RURAL SCHOOLS

The College, as in the past, has rendered good service in the propaganda in favor of more attention to agriculture in public schools. This work has been under the immediate supervision of the Director of Elementary Agricultural Education of the Education Department, who has had his headquarters at the College. The features of this work at the College during the past year have been the following:

1. The holding of the Sixth Normal Teachers' Class in Elementary Agriculture between April 20th and June 26th. Teachers attended and were awarded certificates in Elementary Agriculture and Horticulture by the Department of Education.

2. The Eleventh (not counting those that were held in the years 1893 and 1894) Summer School for Public School Teachers, between July 2nd and August 7th, with an attendance of 64 in the first year's class and 32 in the second year's class. All the teachers completing the two summer courses become eligible for the Elementary Certificates in Agriculture and Horticulture, and when they carry out the agricultural work for rural and village schools, obtain special grants from the Department of Education.

3. The Second Summer School for High School Science Teachers, July 2nd to August 7th. Sixteen teachers attended the first year's class and thirteen the second year's class. The teachers completing the two summer courses successfully are eligible for the Intermediate Certificate in Agriculture and Horticulture awarded by the Department of Education, and obtain special grants when they carry out the prescribed agricultural courses in the High Schools.

4. The First Rural Teachers' Conference from August 2nd to 7th. This was attended by about 125 delegates from the Teachers' Associations of the Province. Two rural teachers represented most of the Associations. Their travelling expenses were met out of the appropriations from the Federal Funds. At the fall conventions of the Associations they reported to their fellow teachers and discussed Ontario's rural problems in their relationship with the schools. Many delegates have been carrying on successful propaganda through their local press and by addressing Women's Institutes, trustees' meetings, etc.

5. The continuance of the work of the Schools' Division of the Experimental Union. Planting material and instruction sheets or circulars were sent to about 500 schools.

## APIARY INSTRUCTION AND INSPECTION

The demand for information on beekeeping has shown no abatement, and consequently there has been a great deal of interest taken both in the work at the College and in the local demonstrations held throughout the Province. There were in all 55 of these demonstrations held with an average attendance of 34 at each. In addition the usual work in inspection to counteract Foul Brood has been carried on, and while the disease has no doubt been held in check, it unfortunately does not

Demonstrating best methods of Beekeeping.

appear to be disappearing. In reference to European Foul Brood 603 visits were made by the Inspectors and 300 apiaries were found to have the disease. In these apiaries 1,786 colonies out of a total of 4,843 were found to be affected. A total of 713 visits were made in regard to American Foul Brood, 219 apiaries being found diseased. In these there were 928 colonies affected out of a total of 4,270. It is of course to be remembered that visits are only made where it is suspected the disease exists, and hence the proportion found would not fairly represent the proportion throughout the Province as a whole.

# ONTARIO VETERINARY COLLEGE

With the opening of the term this institution moved into its new quarters on University Avenue and thereby entered on a new epoch in its history. Conveniently constructed, thoroughly ventilated and beautifully lighted, the building is admirably adapted for the purpose for which it is intended. The laboratories, class-rooms, museums, veterinary hospital and operating-room are all commodious and well-equipped and will fill the needs of veterinary education in this Province, in fact in this Dominion, for many years to come. Situated on University Avenue,

Splendid new Veterinary College.

it is convenient to the University of Toronto, with which it is affiliated and from which the students secure a number of lectures during the term.

The attendance this year is 334, as against 373 last year, the decrease being attributable to the outbreak of war, and the circulation of a rumor across the line that the College was not likely to open this year.

The demand for veterinary surgeons in the Army was responded to by members of the faculty, and hence the work of the term is being conducted under the dual handicap of a re-arrangement of the teaching staff and of getting settled in a new building. The work is proceeding, however, very satisfactorily.

## BUREAU OF INDUSTRIES

The value of the publications, especially of Bulletins, has been further attested by the continued requests for information. To meet this demand a large supply of most timely Bulletins in simple, concrete form, have been issued. The following figures show the work in that connection:—

| | | |
|---|---|---|
| *174. | Farm Underdrainage: Does it Pay? | 12,000 |
| *175. | Farm Drainage Operations | 25,000 |
| 218. | Birds of Ontario in Relation to Agriculture | 25,000 |
| 219. | San Jose Scale and Oyster-shell Scale | 30,000 |
| 220. | Lightning Rods | 40,000 |
| 221. | Food Value of Milk and its Products | 40,000 |
| 222. | Currants and Gooseberries | 15,000 |
| 223. | Fertilizers in Relation to Soils and Crop Production | 35,000 |
| 224. | Greenhouse Construction | 20,000 |
| 225. | Swine | 40,000 |
| | | 282,000 |

*Revised editions.

The following Crop and Statistical Bulletins have been distributed:—

| | |
|---|---|
| Crop Bulletin 117, November, 1913 | 17,000 |
| Crop Bulletin 118, April, 1914 | 6,000 |
| Crop Bulletin 119, May, 1914 | 6,000 |
| Crop Bulletin 120, August, 1914 | 6,000 |
| Municipal Bulletin, No. 8 | 6,500 |

The distribution of the Annual Reports has been continued and the following are the figures of the numbers distributed:—

| | |
|---|---|
| Minister's Report | 25,000 |
| The Ontario Agricultural College | 28,000 |
| The Experimental Union | 25,000 |
| The Ontario Veterinary College | 4,000 |
| Agricultural Societies and Field Crop Competitions | 20,000 |
| Horticultural Societies | 15,000 |
| Vegetable Growers' Associations | 8,000 |
| Live Stock Associations | 30,000 |
| Stallion Enrolment Board | 8,000 |
| Farmers' Institutes | 4,000 |
| Women's Institutes, 1 and 2 | 33,000 |
| Dairymen's Associations | 26,000 |
| Entomological Society | 3,500 |
| Fruit Growers' Association | 4,000 |
| Fruits of Ontario | 10,000 |
| Ontario Corn Growers' Association | 6,000 |
| Beekeepers' Association | 4,500 |
| Bureau of Industries (Agricultural Statistics) | 7,000 |
| | 261,000 |

## AGRICULTURAL SOCIETIES BRANCH

Coming as they did so soon after the declaration of war and while the first great shock of the catastrophe still gripped the minds of all, the Fall Fairs were held under a considerable handicap. It is a tribute to the efficiency of the local managing Boards and to the loyalty and optimism of the people that in almost every case a most successful Show was held. Many of the Shows, especially those in the larger centres, were adversely affected by the action of the railways in refusing to allow the usual single fare rate. Still the attendance was well up to the mark and the exhibits excellent. A very favourable factor was the uniformly fine weather which prevailed throughout the autumn. One proof of this is seen in the fact that only slightly over twenty-five per cent. of the $10,000 set aside by the Government for weather insurance was required.

Owing to the financial conditions which prevailed at the time, the Government found itself reluctantly compelled to cancel the plan usually adopted of sending out expert judges. This no doubt occasioned some disappointment, but everyone endeavored to make the best of the situation with fairly satisfactory results.

Local Representative at a Local Fair.

### ANOTHER ADVANCE HAS BEEN MADE IN FIELD CROP COMPETITIONS

From the inception of these Competitions in 1907 up to the year 1913 inclusive, Agricultural Societies entering these Competitions had been restricted to one crop. In 1914 this sphere of work was greatly extended by allowing Societies to enter in three crops if they so desired. This was taken advantage of by a number of Societies, 110 entering in one, 38 in two, and 24 in three crops, a total of 258 competitions as against 159 in 1913. Oats were, as usual, the choice of the majority, 143 Societies selecting this crop, 35 corn, 35 potatoes, 18 barley, 6 fall and 6 spring wheat, 5 peas, 4 mangels, 3 turnips, 1 alsike clover, 1 red clover, and 1 sugar beets. As compared with 1913 the entries for 1914 were as follows:—Oats show an increase of 30 per cent.; corn, 75 per cent.; potatoes, 191 per cent.; barley, 125 per

cent.; fall and spring wheat, each 100 per cent.; peas, 400 per cent. Red clover entries show no increase, while alsike clover, mangels, turnips, and sugar beets appear in the list for the first time in 1914. The acreage judged was 60,000, and 6,400 farmers took part in these competitions. It required the services of 110 men to judge the field promptly as the crops ripened.

Each Society entering a crop received a grant of $50, making a total grant of $150 when three crops are entered. This has to be supplemented by the Society with $25 for each crop. Six prizes of the value of $20, $15, $10, $8, $6, $4, must be given by a Society for each crop without any deduction except the membership fee when that has not been previously paid.

The improvement manifested, not only in the standing crops in the field, but in the preparation of grain and sheaves for exhibition, and of grain for seed by members of Agricultural Societies who have participated in these competitions for a number of years, is very evident, and those who exhibit for the first time get much-needed education in the selection of grain by comparing their own products with those of others who have had greater experience in this line of work. This is especially noticeable at the Guelph and Eastern Winter Fairs, where most of the grain sold is purchased by farmers who will pay good prices for such as is clean and of good quality, while exhibits with seeds of other varieties in them do not realize more than market prices.

Plowing matches are attracting much interest.

Short Courses for Standing Field Crop Judges were again held during the first week of July. Those from York County and West attended the Ontario Agricultural College, Guelph, and the Eastern Judges the Experimental Farm, Ottawa. Two very profitable days were spent at each of these institutions, and one feature noted was that the sessions were well attended, all the Judges being present. The Courses of 1914 will long be remembered with pleasure and profit by the several hundred Judges present.

The Field Crop Exhibits at the larger Fairs of Ontario receive favourable comment on every hand. They were much more numerous and compared favourably in other respects with those of previous years.

## FLOWERS AND VEGETABLES

The Horticultural Societies continue by their good work in encouraging individual and civic improvements to attract new members. The returns for 1914 show a total membership of 14,000, some city Societies having a membership of upwards of 1,000. The local Societies distribute seeds, plants, and shrubs, and in this way, as well as through the lectures sent out by the Department, exert a splendid influence in the improvement of their district.

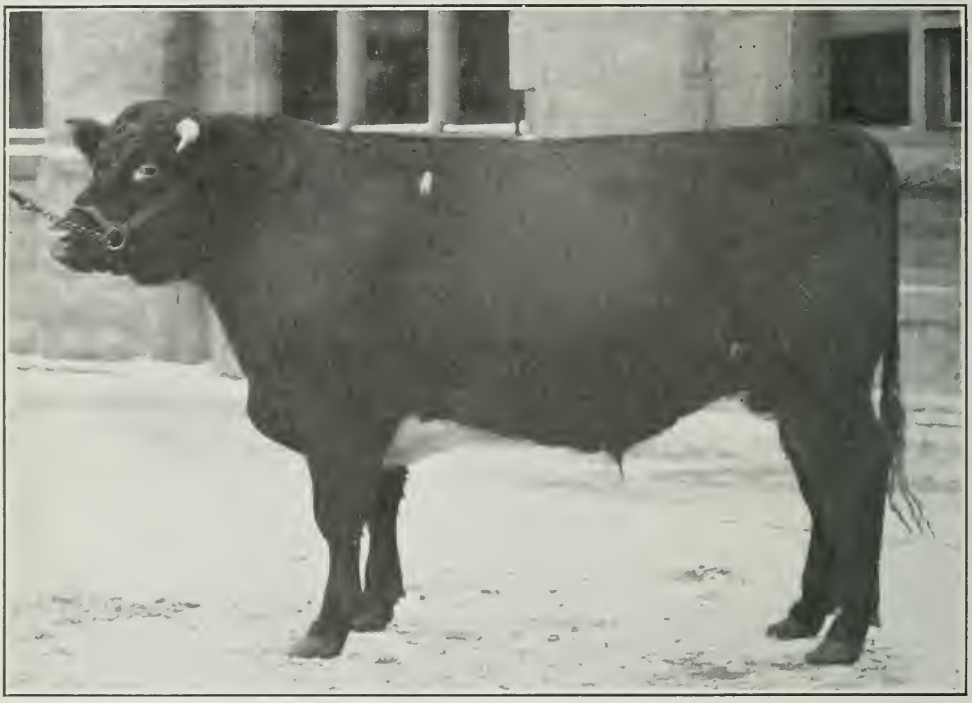
The Ontario Vegetable Growers' Association also continues to do good work. They have taken hold of field crop competitions in vegetables and are finding them very helpful and beneficial. They are also developing co-operation in buying and selling. A problem which must receive attention in the future is that of seed supply. Large quantities of seed have in the past been imported from Germany and Holland and these supplies cannot be counted on in the future. It is thought there is available an adequate supply for next season and arrangements will no doubt be made for growing quantities here.

The Ontario Plowmen's Association, in addition to encouraging the formation of local Associations, has made a big success of the Provincial Plowing Match held, through the generosity and courtesy of Major Kilgour, on Sunnybrook Farm, Eglinton.

## LIVE STOCK BRANCH

The feature of the work of this Branch during the past year has been the enforcement of the Stallion Enrolment Act. In this it has been ably assisted by the Stallion Enrolment Board, which has held meetings from time to time to draw up regulations, pass upon inspections and such other work as was necessary. so that the inspection of all stallions became compulsory. Prior to that it had

At the last Session of the Legislature it will be recalled the Act was changed so that the inspection of all stallions becomes compulsory. Prior to that it has been optional. Looking to the future it was also decided to gradually eliminate grade stallions altogether. It was provided that after August 1, 1916, no grade



Championship Steer at the Winter Fair.

stallions having any disease or malformations mentioned in the regulations, should be allowed to travel. This is intended to eliminate what is commonly known as the "scrub." This is followed up by the provision that after August, 1918, no grade stallion whatsoever shall be allowed to stand or travel. By thus giving ample notice to those interested it is hoped the country will be cleared of undesirable sires without hardship to anyone but with great advantage to the horse-breeding industry of the future. With the devastations of the war seriously interfering with the importation of new blood as in the past, too much attention cannot be paid to securing high quality in our Canadian-bred sires, and it is hoped all interested in the welfare of this important industry will co-operate to make this legislation an important factor to that end.

The first inspection under the new Act took place in the fall, when 3,201 stallions were enrolled and inspected, an increase of 441 over the previous year. Every effort has been made to advise every stallion owner of the terms of the Act, yet every little while someone is pleading ignorance of the Act and asking for inspection. It is hoped these will all be heard from before the breeding season opens.

### SUCCESSFUL STOCK SHOWS

The number of Shows assisted through the Live Stock Branch shows a steady increase. In addition to the Winter Fairs at Guelph and Ottawa, financial assistance was given to 25 Horse Shows and 44 Poultry Shows.

Despite additions made from time to time for the accommodation of the Winter Fairs, owing to continued growth the capacity is taxed to its utmost. The Fair at Guelph, held in December, 1913, was the most successful ever held, there being

Prize winners at the Winter Fair.

an increase of entries in every Department ranging from fourteen per cent. in the case of Dairy Cattle to fifty-three per cent. in the case of Swine.

There was every indication that the Ottawa Winter Fair for 1914 would have surpassed all records, but a boiler explosion which wrecked the building unfortunately occurred on the morning of the second day, and it had to be cancelled. A great deal of damage was done, both to the buildings and the stock, but with financial assistance from Provincial and Federal Governments and the City of Ottawa, the Fair Executive have been able to settle all claims and look forward to continuing the Show in 1915.

### POULTRY ASSOCIATIONS

Provision has been made by an Order-in-Council for the organization of one recognized Poultry Association.

(*a*) In each Electoral District in the Province, except that not more than one Association may be recognized in any incorporated city.

(*b*) In any incorporated city, whether or not it is an Electoral District.

A recognized Poultry Association is one that is entitled to receive a government grant of fifty dollars and to have a lecturer supplied by the Department at a meeting which is held in most cases at the time of the Annual Poultry Show of the Association. Each Association is required to hold a show each year. The amount of prize money paid to exhibitors exceeded $10,000. The meetings were well attended and the work being done by these associations is adding greatly to the interest taken in the improvement of poultry conditions.

### CO-OPERATIVE SHIPMENTS OF PUREBRED STOCK TO WESTERN CANADA

The plan of shipping pure bred stock to the West, was carried out during the past year, as it had been done in the two previous years. There were twelve cars shipped in all, the numbers and breeds in each shipment were as follows:

| — | Jan. | Feb, | Mar. | April | May | June | July | Oct. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| Horses— | | | | | | | | | |
| Clydesdale | 7 | 2 | 7 | 8 | 2 | 4 | 1 | 5 | 36 |
| Shire | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | 2 |
| Percheron | ..... | 5 | ..... | 4 | ..... | ..... | ..... | ..... | 9 |
| Standard-bred | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 |
| Thoroughbred | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Hackney | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 1 |
| Cattle— | | | | | | | | | |
| Shorthorn | 26 | 11 | 8 | 9 | 6 | 3 | ..... | 2 | 65 |
| Aberdeen-Angus | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 |
| Galloway | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Ayrshire | ..... | ..... | 4 | ..... | ..... | ..... | ..... | ..... | 4 |
| Holstein | ..... | 4 | ..... | ..... | 1 | 2 | 2 | ..... | 9 |
| Jersey | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 1 |
| Hereford | ..... | ..... | ..... | 1 | 9 | ..... | 7 | ..... | 17 |
| Sheep— | | | | | | | | | |
| Cotswold | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Leicester | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Shropshire | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Southdown | 9 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 10 |
| Hampshire | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Suffolk | 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 20 |
| Cheviot | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Dorset Horn | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Swine— | | | | | | | | | |
| Yorkshire | ..... | 2 | ..... | ..... | 5 | 2 | ..... | 1 | 10 |
| Berkshire | ..... | 3 | 1 | ..... | 1 | ..... | 1 | ..... | 6 |
| Tamworth | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Chester Chite | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Duroc Jersey | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... | 2 |
| Hampshire | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 1 |
| Total | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200 |

# INSTITUTES BRANCH

Institutes of all kinds continue to reach and interest a large number of farmers and women of the farm and allied interests. With the increasing number of special meetings, short courses, etc., there is not the same call for the regular Institute meetings. The attendance during the twelve months ending with October, 1914, was as follows:

*Regular and Supplementary Meetings.*

| | |
|---|---|
| Farmers' Institutes | 92,660 |
| Women's Institutes | 202,504 |

*Special Institutes.*

| | |
|---|---|
| Women's Institute Demonstration Lectures | 15,500 |
| Farmers' and Women's Institute Conventions | 13,575 |
| Seed and Live Stock Judging Classes | 24,552 |
| Dairy Meetings | 12,446 |
| Total | 361,237 |

Typical farm on Manitoulin Island, where Agriculture is making good progress

## FARMERS' CLUBS

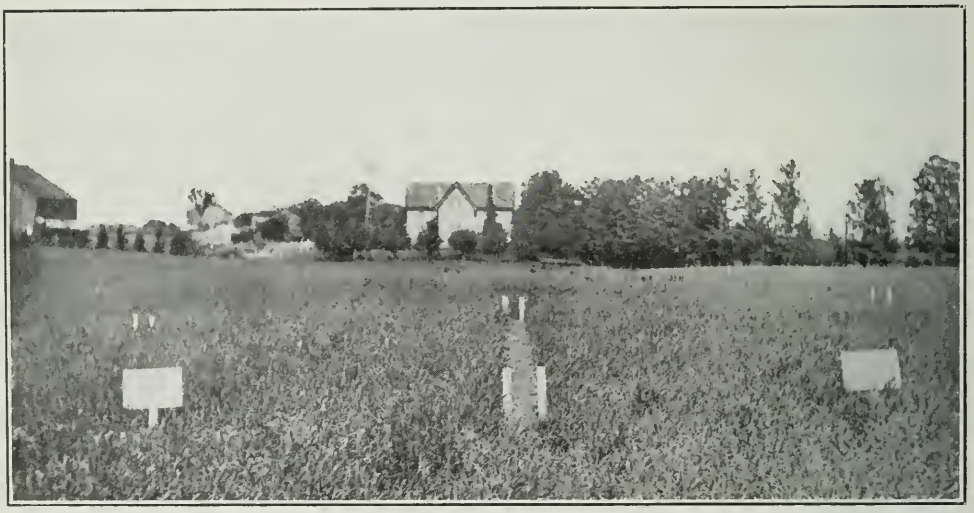
The history of agricultural development in Ontario contains evidence of the beneficial results both to the individual and the community following upon the organization of local societies (Farmers' Clubs) for the purpose of studying, discussing and debating agricultural problems, improving the members in a literary way, and affording a healthful social life. The Department has encouraged these organizations through the Institute system with the aid of the District Representatives for several years. The number of clubs now reaches the 300 mark, with evidence of growing appreciation on the part of the farmers as to the value of the local organization, through which it is possible to do much more for a community than when the Department officials require to work through the individual.

At the meetings topics directly bearing on the financial improvement of the members through improved methods of soil cultivation, drainage, seed selection, harvesting, etc., are exhaustively discussed. The selection and breeding of horses, cattle, sheep, swine, and poultry are all considered and the plans of buildings for their health and comfort in the economy of production become items of interest. Questions of purchasing and marketing also receive attention, and reference to this is made in connection with the work of the co-operation and markets branch.

In a number of localities removed from a meat shop beef rings have been successfully operated by the members, thus providing a supply of fresh meat during the warm weather.

### SHORT COURSES IN STOCK AND SEED JUDGING

Institute workers of long experience report that Short Courses in Stock Judging afford one of the most effective means of instructing and impressing the farmer, especially the young farmer, in the wisdom of judicious selection and definite work



Farm demonstrations are an effective method of instruction.

in the betterment of the herds and flocks. During the year some 85 Short Courses were held, most of them embracing two days' work, with an evening meeting at many points. The District Representative, in a great majority of cases, makes local plans for the carrying on of the Short Courses in Stock Judging. There is much evidence of improved methods in live stock breeding and feeding as a direct result of the Short Course, and the policy will be to extend this feature where proper facilities exist and suitable stock can be secured.

### WOMEN'S INSTITUTES

The work of the Women's Institutes is now so well and favorably known that only a brief reference to some outstanding features will be made in this volume.

The organization which has for its motto "For Home and Country," and whose members have been continuously asking themselves what they can do as individual members and as a society to better conditions in the homes and from a community standpoint, could not but respond most liberally to the special appeals made necessary by the gigantic struggle in which the Empire is involved.

Up to the outbreak of the war, emphasis has been placed upon household, school, health, community improvement and local relief matters. When the appeal was made for assistance to the Hospital Ship, the Red Cross and the Belgian Relief Funds there was a most liberal response, many of the Institutes giving up their regular programmes and devoting their energies to collecting funds and to making clothing and hospital supplies. Up to the end of the Institute year the amount donated in cash was about $25,000 (at the time of going to press the total is over $40,000), and in addition large quantities of clothing, hospital supplies and clothing were donated. The activities of the Institutes in this work will be a standing monument to the women of the rural districts of Ontario.

With 850 branches and a membership which is continually increasing, it was deemed advisable to plan for Conventions at three points instead of one—London, Ottawa, and Toronto. Splendid programmes were prepared for these Conventions and all were successful beyond the expectations of the most optimistic. There is no question but that the Women's Institutes are one of the strongest factors for rural betterment in the Province of Ontario.

### DEMONSTRATION-LECTURES COURSES

This feature of work was continued during the past year and a large number of places were visited by instructors who gave systematic Courses in "Sewing," "Food Values and Cooking." Sytematic instruction embracing from ten to fifteen lessons on a definite line is very much appreciated by the women of the rural districts, who had previous to the past two years only isoloated lectures and demonstrations upon these lines of work. The aim of the Department is to make it possible for the girls and women of the rural district to be given at least a brief course of instruction in those lines of practical value in their every day responsibilities.

### DAIRY WORK

The past season has been one of unprecedented high prices so far as cheese is concerned, and, while the prices for butter were rather weak during the early summer season, later on the market became more active and high prices ruled. Altogether the season was very satisfactory from the dairyman's standpoint. Confidence in the future of the industry is evidenced by the tendency on the part of dairymen to raise a larger number of calves, to provide food, to supplement the pastures during the dry, hot weather, improvement in stables, erections of silos, etc.

There were 992 factories in operation during the season of 1914, with 38,092 patrons, while there were 161 creameries, with 36,634 patrons, and a total output of about 23 millions pounds of butter. The exact figures for cheese output for 1914 cannot be secured until the instructors make their visits during the early part of the season of 1915.

Sufficient information is to hand to prove that the output of the cheese factories in Western Ontario was above that of the previous year, while in Eastern Ontario, largely on account of partial failure of crops in some sections and decrease in the number of producing cows, it was considerably reduced. Taking the Province as a whole, the total output of dairy products, i.e., cheese, butter, condensed milk, milk and cream for city trade, etc., was equal in value to that of any former year. It is gratifying to note that the average production per cow has been increased considerably, being from 150 to 175 pounds

greater than the previous year. In the dairy herd competition conducted by the Dairymen's Association of Western Ontario the first prize herd produced 7,923 pounds per cow for the six months from May to October.

Reports from all sections of the Province would indicate that the general quality of the cheese was quite superior, and the quality of butter well up to the average. There is a gradual and continuous improvement in the sanitary conditions of the factories and creameries. They are also bettering their storage facilities in many sections, and a proper system of sewage disposal has been installed at many plants. The number of creameries to pasteurize their cream is gradually increasing, last season 56 being well equipped in this respect.

The milk sediment test was utilized to quite an extent during the year for the purpose of demonstrating to the factorymen and the patrons the necessity for thorough cleanliness in the production of handling of milk. What often appeared to be clean milk, was shown by the use of the sediment test to contain a considerable amount of sediment. The more general use of this test will, no doubt, result in a still further improvement in the supply of the raw material, which is essential if the improvement which has marked the operations of the past years is to continue.

Much of the advance recorded is due to the holding of factory and creamery meetings, as well as a few district dairy meetings. During the past year 232 of these were held, with a total attendance of 12,446.

The Dairy School at Kingston continues to render valuable service to the dairymen of the eastern section of the Province. Those who attend this school have the advantage of instruction in Bacteriology and Chemistry by members of the Faculty of Queen's University.

Thirty-three dairy instructors rendered valuable service during the season, visiting every factory and creamery periodically, thus insuring high quality and uniformity.

Altogether the future of dairying in Ontario is very promising.

# FRUIT BRANCH

The past year in the fruit industry has been abnormal in several ways. Early in the season it was seen that the peach crop would be practically a failure through the freezing of the peach buds during the winter. In isolated cases, chiefly in Lambton and Essex Counties, fair crops were harvested and some of the hardy varieties produced a medium crop quite generally. On the whole, however, the orchards were bare of peaches, bringing hardship to many growers who had practically nothing but this fruit on their farms. As a consequence of this many acres of tomatoes were planted as a catch crop, but prices for tomatoes were low during the height of the season.

In the early part of the season it was quite generally estimated that the apple crop in Canada and the United States would be the largest produced in many years, and it was therefore felt that prices would rule fairly low. While the crop

Apple growing is becoming an esablished industry on St. Joseph Island, Algoma, as proven by recent extensive plantings. Here is an orchard in varying stages of development.

has not been quite as large as early estimates predicted, yet the war disturbance in Europe has been a decided factor in keeping the prices of apples down. Buyers did not appear—would not take the risk. As is usual in a year of large apple crops, many of the varieties of apples which should properly be used as winter varieties were placed on the market quite early, thus depressing the market still further. This condition, however, should find its reward in enhanced prices for winter stock that is being held for 1915 trade.

Apart from the large crop on this continent and war conditions in Europe, another fact which tended to keep the price of apples down was the abnormally large crop of good quality apples produced in Great Britain, which country takes quite large shipments from Canada and the United States.

Another factor, a by-product of the war, was the inability of the evaporators to continue business as usual. During recent years quite a large trade in evaporated apples has been built up with Holland and Germany, and this was of course all cut off. The result was many evaporators did not start at all, while others ran only for a short time.

Under all these circumstances it was only natural that the marketing problem should be forced to the front as never before. A Dominion-wide advertising campaign was launched by the Dominion Department of Trade and Commerce and no doubt was quite influential in increasing trade. Above all, however, it emphasized the value of the co-operative associations. Associations which put up apples of good quality in attractive style were able to secure markets at fair prices, compared to those secured by growers depending on their own individual efforts. Questions of marketing and distribution must loom larger in the fruit industry in the future, but the basis must ever be quality and attractive packing.

It is only fair to note here that large quantities of apples were given away by the growers to needy ones in towns and cities. In addition to a great deal of generosity of this nature shown locally, arrangements were made through this branch by which a number of co-operative associations sent car-load lots to Toronto, the cost of the freight and bags being borne by the city by whom the distribution was made. Altogether about 10,000 bags were contributed in this way by the following: Oakville, Georgian Bay, Thedford, Oshawa, and Welland Fruit-Growers' Associations. Assistance was also rendered the Salvation Army in gathering up apples for the poor.

## DEMONSTRATION ORCHARDS

As in former years, several orchards in many parts of the Province were pruned and sprayed under the direction of the Fruit Branch for demonstration purposes. This work was undertaken in the Counties of Lambton, Middlesex, Brant, Peel, Prince Edward, Ontario and York. The following newspaper reports in reference to two of these orchards are valuable as coming from outside sources:

## PRUNING AND SPRAYING

### Middlesex Experimental Orchard Gives Good Returns—Value of Apples Increases from $75 to $400 in Two Years

**(Montreal Star, Dec. 2, 1914.)**

In 1912 a two and a half acre orchard in Lambeth, Ont., yielded a crop valued at $75, in 1913 a $200 crop was harvested, and in 1914 this was double again, $400 being realized for the apples.

The first return of $75 came from an orchard that had not been pruned or sprayed for 25 years. The trees grew. apples were formed, ripened, fell to the ground, and possibly only noticed for the first time until they were seen in the latter state. The owner of the orchard, Mr. A. K. Sadler, says himself: "I received about $75 for apples that I never gave a thought to all the year, and just picked them up off the ground in the fall."

The orchard was put into the hands of experts from the Ontario Fruit Branch in the spring of 1913 for demonstration purposes. The orchard contains Spies, Greenings, Baldwins, Kings, Russets, Tolman Sweets and Ben Davis.

When taken in hand by the experts the orchard was found to be full of old wood. With the exception of a few trees left as a contrast, the whole orchard was trimmed back. In a number of cases the tops of the trees were cut back unmercifully, while a path of four feet was cut between the rows where the trees had grown together. So severe was the pruning that the uninitiated neighbors declared the orchard was spoiled. What was left of the trees, managed, however, to bear the largest and best colored apples ever seen in the orchard.

This spring, shortly before the buds on the trees were ready to burst, the first

PRUNING AND SPRAYING.—Continued.

dose of spray was put on. Commercial lime sulphur, one part of spray to eight parts of water was used. The next spray was used before the blossoms opened. Lime sulphur diluted one to thirty was used and two and a half pounds of arsenate of lead to forty gallons of the spray. Just after the blossoms had fallen, a third dose was put on the trees, the lime sulphur being diluted one to thirty, with the same amount of arsenate of lead used in the previous spray. Two weeks later the orchard received its fourth and last spray, the same as the third dose.

"Altogether," says Mr. Sadler, "I do not think the cost of spraying the orchard and the time used in doing the work was more than $40 at the outside. It took us a little over three days to give the trees the four sprays."

The difference between the trees that had been sprayed, and the check block, has opened many eyes in the district to the possibilities of improving orchards by spraying. Not a basket of saleable fruit was to be obtained from the unpruned and unsprayed check block, while the fruit from the pruned and sprayed trees was all No. 1.

This is one instance of what can be done to make the orchard yield a handsome profit, and change the value of the crop from $75 to $400 in two years. Others can take advantage of Mr. Sadler's experience, and get their trees cut back before next spring. The first season will prove the wisdom of pruning and spraying.

## FINE CROP OF APPLES AT THE ORPHANAGE

(Picton Gazette.)

The children at the Loyal True Blue Orphanage are, these days, enjoying the fine crop of apples that Orphanage orchard has this year produced.

For some years past the apple crop on the farm has been very light, and those in charge state that last year there was not a bushel of apples in the whole orchard. This year under the charge of the Ontario Department of Agriculture, the orchard has a magnificent crop of apples of the very best quality, the result of intelligent and scientific care. Early this spring the trees were pruned. The old dead wood was all cut away and the tops properly thinned. Three thorough sprayings were given during the season and the result is an excellent crop.

The orchard is almost entirely Spies and Russets. Owing to the intelligent trimming, the fruit is highly colored and of unusual size, and remarkably free from worms and scabs, because of the thorough spraying.

Mr. Wellington Boulter who has the business management of the farm this year, and also the disposal of the apple crop, has had an offer of $2.50 per barrel for all the No. 1 Spies and Russets. This offer is ample evidence of the quality of the fruit. It is estimated that the yield wil be at least 200 barrels of No. 1 fruit. A portion of the crop has been packed and it is running 85 per cent. No. 1. A portion of the crop will, of course, be reserved for the use of the Orphanage and this institution is thus assured of a good supply of one of the best, most useful, most nutritious fruits that could be secured for the children, a supply of which is so essential to their well-being.

Under the management of the Ontario Department of Agriculture this year, this orchard has as a demonstration orchard been a decided success. Not only has the orchard been made productive, but the apples produced are of such a quality that in a season when most fruit is unsaleable their crop commands a fairly good price.

In addition to these purely demonstration orchards, three other orchards of approximately four acres each were leased by the Fruit Branch for a period of years, partly for demonstration purposes, but more particularly for the carrying on of extended commercial experiments in cultivation, pruning, spraying, fertilizers, etc. These three orchards are located in Prince Edward, Ontario and Brant Counties. It was thought by getting orchards in several localities and treating each the same for six or seven years something of value to the fruit-growers of Ontario would be learned. Some orchardists had good results with one spray material, others preferred something else. Some growers use Bordeaux mixture and Paris Green and say they cannot grow clean fruit with any other mixture. It was therefore felt that experiments to determine this and other equally important commercial problems should be conducted.

In these three orchards one-half is being cultivated, the other half left to sod, so that the results under both sod and cultivated conditions can be determined. Four spraying experiments are being conducted as follows:—

1. Commercial Lime Sulphur with Arsenate of Lead.
2. Soluble Sulphur with Arsenate of Lead.
3. Bordeaux Mixture and Paris Green.
4. First spraying Commercial Lime Sulphur.
   Second spraying Bordeaux Mixture.
   Third spraying Commercial Lime Sulphur.

This last spraying experiment is done to find out if Bordeaux Mixture for the second spray will control the scab better than three sprayings of Lime Sulphur, as is claimed by many growers. One part of each experiment had a fourth spray: several rows were sprayed with powdered Arsenate of Lead instead of paste.

Spraying is Essential to Control Pests.

## PACKING FRUIT

More interest is being displayed each year in the proper packing of fruits. Many more boxed apples are finding their way from Ontario to the Northwest market each year, and the pack and grade are such as to compare very favorably with any Western boxed fruit. During the past year one or two associations put up their pack in boxes altogether, which is a very decided change in Ontario. Box Packing Schools were conducted by the Department in the Counties of Dundas, Hastings, Prince Edward, York, Haldimand, Welland, Oxford, Elgin, Kent and Lambton during the months of January, February and March. Several Packing Schools were also held at the Agricultural College at Guelph during the Short Course in Horticulture. With one or two exceptions, the schools, of which over

twenty in all were held, were well attended, there being ten to forty pupils taking the course. Fifteen or twenty pupils are about as many as one instructor can competently handle.

Packing Demonstrations and a Horticultural Information Bureau were conducted at the Hamilton, Oakville, Milton and Burlington Fall Fairs. These were in the nature of an experiment to determine what interest would be taken in them by the people, and whether they would take this means of having some of their fruit problems discussed by someone familiar with fruit conditions. With one exception these demonstrations were very successful.

### PRUNING DEMONSTRATIONS

More growers each year are coming to see the advantage and benefit to be derived from the proper pruning of their orchards. In some counties the District Representative has been able to give all the necessary instruction at these demonstrations, while in other counties they have been conducted by the Fruit Branch staff. That there is quite generally an awakening along pruning lines in the better apple sections is shown by the attendance at these demonstrations. The average attendance at four demonstrations conducted in the County of Peel was over 70, there being an attendance of over 100 at Dixie.

In September, 1914, pruning experiments, to be continued indefinitely, were started in a Peel County orchard. This experiment is to determine, if possible, just what months of the year it is best to have the pruning done, and whether the pruning could safely be done in any month of the year. Four full bearing trees —one Spy, one Russet, one Greening, one Baldwin—are to be pruned each month in the year, so that during the year a total of 48 trees in all will be pruned. This experiment carried on for a sufficient number of years to give accurate results should be of very great value.

### CONTROLLING PESTS

The Provincial Entomologist having successfully completed his experiments with the Cherry Fruit Fly has now issued a bulletin giving simple but effective measures for the control of a pest which threatened to cause serious trouble to the growers of cherries in the Niagara Peninsula and adjoining districts.

With the aid of the provincial and local inspectors, the Yellows and Little Peach diseases have practically been eliminated, the number of trees having to be destroyed the past season running slightly over 2,000, as compared with over 50,000 two years previous.

Good work has also been accomplished in the fight against San José Scale in the Niagara Peninsula. On the tender fruits such as peach, pear and plum, growers no longer fear its attacks, as spraying during the dormant season is so generally practiced that the scale is readily held in check. Some trouble is yet experienced with the old apple orchards in this district, the spraying of which is more difficult and not so effective. A number of orchard owners have neglected their trees and as these cases have been reported or come otherwise under the notice of the Department, such orchards have been destroyed either by the owners or by the inspectors.

In the western parts of the Province that are infested with this Scale, very little is being done to combat its effects. Fruit growing is mostly confined to apples, and in many cases is but a very small part of the farm operations, with

the result that very little energy is expended in an effort to check the Scale. Demonstrations and lectures have been widely used to stir up public feeling, but the farmers have not taken hold as quickly as might be desired. With a view to handling such districts, the Department during the past season has introduced into a number of sections parasites of the San José Scale which have been doing excellent work in Pennsylvania in checking the increase of this insect.

### BULLETINS

The publication "Fruits of Ontario," which has been under revision for some time past, was issued early in the year. In the revised edition, new varieties and new photographs have been included, and the descriptions of varieties and cultural directions have been brought up to date as much as possible. Other Bulletins issued were No. 219 on "San José and Oyster Shell Scales" and No. 222 on "Currants and Gooseberries."

### EXPERIMENTAL FRUIT FARM

The following list of experiments at present receiving attention at this institution at Vineland may be of interest:—

*Apples*:

(1) A thinning experiment to determine the cost of thinning, the increase in the value of the fruit, the effect on trees that are biennial bearers and the time saved in picking and grading the thinned over the unthinned trees.

(2) A spraying experiment to determine the comparative value of lime sulphur and soluble sulphur for the control of San José Scale and Apple Scab. With each solution is used on a number of trees arsenate of lead or arsenite of zinc to test the relative value of the two poisons for the control of the codling moth. Carefully taken notes are also being recorded of the relative spray injury to the fruit and foliage.

(3) A pruning experiment. Two hundred Spy trees, 20 rows of 10 trees each, are being used for this.

(4) An experiment to test the comparative value of Red Siberian, MacMahon, Talman Sweet, Ben Davis, Duchess and Pewaukee as stocks on which to top work the Northern Spy.

(5) A cultivation experiment to test the comparative value of the various systems of cultivation. In each section in this experiment two rows of trees are summer pruned, two are winter pruned and two are left unpruned except for the removal of broken, damaged or diseased limbs. This is to test the effect of certain systems and times of pruning in each system of cultivation.

(6) An experiment to test the value of dynamited holes.

(7) The testing of 150 varieties, including 23 of Prof. Macoun's named seedlings.

*Peaches*:

(1) Experiments with Little Peach and Yellows are being conducted by Prof. Cæsar, O. A. College, Guelph, Ontario; experiments with Peach Canker are being conducted by Mr. McCubbin, Assistant Dominion Pathologist, St. Catharines.

(2) An experiment to determine the relative value of nitrogen, phosphoric acid, potash, and complete fertilizer.

(3) An experiment to determine the value of fall planting. (This is being discontinued because of the heavy losses from fall planting.)

(4) An experiment to determine the value of plum roots for the peach under certain conditions.

(5) Testing 147 varieties, a large number of which are on both clay and sand soils.

*Plums*:

(1) Fall vs. spring planting vs. dynamited holes.

(2) Testing 130 varieties.

*Pears*:

(1) Testing the leading commercial varieties on dwarf and standard stocks.

(2) An experiment to determine the best way of controlling blight. (This is a field study.)

(3) Fall vs. spring planting vs. dynamited holes.

(4) Testing 124 varieties.

*Cherries*:

(1) Fall vs. spring planting.

(2) Testing 32 Sweet and 23 Sour varieties.

*Grapes*:

(1) Testing the various systems of pruning.

(2) Testing the comparative commercial value of nineteen varieties planted side by side.

(3) Testing 54 varieties.

*Strawberries*:

Testing 90 varieties, 12 of which are Prof. Macoun's named seedlings.

*Currants*:

Testing 16 black and 15 red and white varieties.

*Gooseberries*:

Testing 12 varieties.

*Cover Crops*:

Only three cover crops are used: Rye and vetch, oats and clover, and buckwheat. These we consider the three best. This experiment also includes a soil moisture and a depth of freezing test on fall vs. spring plowed land.

*Lime Fertilizers*:

A test is being made of the comparative value of burned lime and lime rock dust (a by-product of the stone crusher) as a fertilizer for fruit trees.

*Irrigation*:

Almost three acres of Skinner Irrigation is being used. Under it as biennial or perennial crops are growing: Raspberries, three varieties; strawberries, 42 varieties; and 1,080 selected asparagus plants. Check plots are growing beside them.

*Vegetables*:

All vegetable work was started in the spring of 1914. Some selections have been made for resistance to rust in asparagus, some selections for yield and quality in garden peas, and some hill selections for yield and quality in potatoes. Tomatoes have received most attention and seed selections have been made from more

than 20 varieties. They are also being tested with and without irrigation. Arrangements have been made for the production of seed of onions, carrots and beets. The aim is not only seed production, but seed improvement and the selection of improved strains.

*Plant Breeding*:

This is much the most important division of the work. 7,600 seedling strawberries from hand pollinations are now growing in the nursery plots. These are from the work done in 1913. The 1914 work is not yet far enough advanced to report on the number. 3,500 raspberry seedlings from the work done in 1913 were set in the field in the spring of 1914. These are all doing well. The 1914 work is not yet far enough advanced to report. More than 1,000 peach seedlings, two years of age or more, are now growing on various parts of the farm. Besides these, about 150 are still growing in the nursery rows. An attempt was made to continue the work on peaches this year at Leamington, but a heavy storm during the blossoming season destroyed most of the work. In plums, only 100 fruits were gathered this year as the result of the large amount of work. In no case did we get a good set of fruit. In pears, seeds to the number of 2,188 were gathered from hand pollinated fruits. These will be planted at once. In grapes, 8,500 seedlings were planted in the spring of 1914. A large number were lost, but we still have more than 4,000. The work of 1914 produced about 20,000 more seeds, which are being planted this spring. Besides this, there has been saved more than 100,000 seeds of our leading commercial varieties. In tomatoes, the work has been confined largely to crosses between the tomato and Solanum balbisii. The Solanum balbisii is comparatively resistant to frost. Also a number of species of plants and fruits have been introduced to use as foundation stock from which to obtain material for breeding purposes.

Though practical results are the aim, and consequently are never lost sight of, an attempt is being made also to study the laws of inheritance. To any one who is particularly interested in plant breeding work or the improvement of a particular fruit, upon request, a detailed report of our work will be forwarded.

## INTERESTING THE BOYS ON THE FARM

A Great Day for the Small Boys and their Colts at the Rural School Fair.

Growing crops for his fair.

# DISTRICT REPRESENTATIVES

The District Representative movement in Ontario has become so well established and so thoroughly understood that it needs no introduction. Beginning as it did in 1907 with six offices it has gradually grown until in the year 1914 we have offices embracing practically the whole of the Province from Glengarry in the

41 offices embracing practically the whole of the Province from Glengarry in the

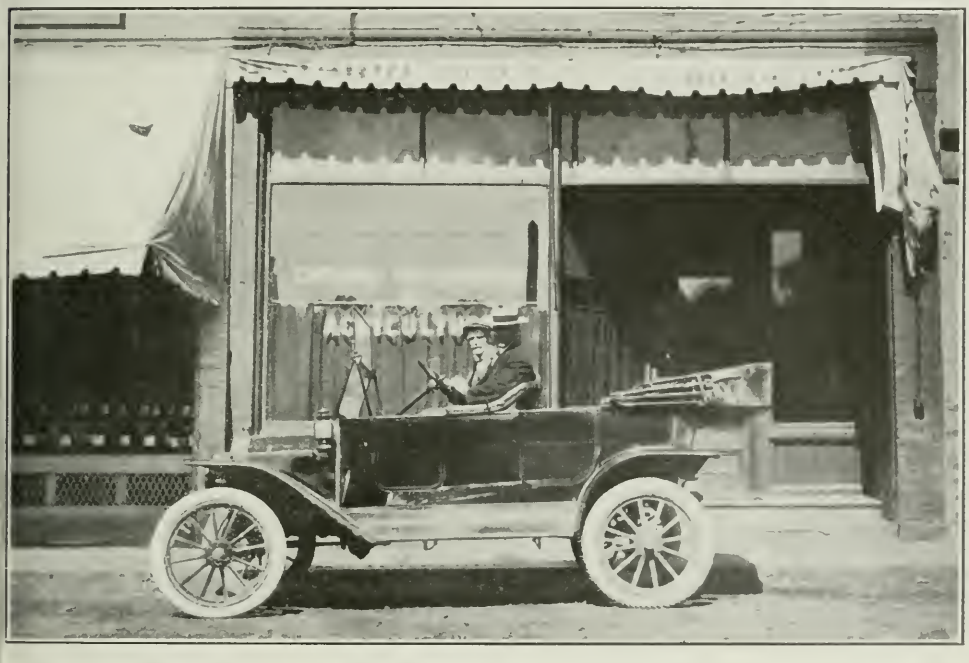
Counties of Halton and Wentworth and the Districts of Thunder Bay and Kenora. The following is a list of the offices:—

| County | Name. | Address. |
|---|---|---|
| Algoma | A. S. Smith | Sault Ste. Marie. |
| Brant | R. Schuyler | Paris. |
| Bruce | N. C. MacKay | Walkerton. |
| Carleton | W. D. Jackson | Carp. |
| Dufferin | H. A. Dorrance | Orangeville. |
| Dundas | E. P. Bradt | Morrisburg. |
| Durham | R. S. Duncan | Port Hope. |
| Elgin | C. W. Buchanan | Dutton. |
| Essex | J. W. Noble | Essex. |
| Frontenac | C. Main | Sydenham. |
| Glengarry | D. E. MacRae | Alexandria. |
| Grey | H. C. Duff | Markdale. |
| Haldimand | G. L. Woltz | Cayuga. |
| Halton | H. R. Hare | Burlington. |
| Hastings | A. D. McIntosh | Stirling. |
| Kenora | P. Stewart | Kenora. |
| Kent | W. T. Hunter | Chatham. |
| Lambton | G. G. Bramhill | Petrolia. |
| Lanark | P. S. D. Harding | Perth. |
| Leeds & Grenville, | W. H. Smith | Athens. |
| Lennox & Addington | G. B. Curran | Napanee. |
| Manitoulin | I. F. Metcalf | Gore Bay. |
| Middlesex | I. B. Whale | London, Box 663. |
| Norfolk | Geo. Wilson | Simcoe. |
| Northumberland | R. S. Beckett | Brighton. |
| Ontario | R. M. Tipper | Whitby. |
| Oxford | G. R. Green | Woodstock. |
| Peel | J. A. Carroll | Brampton. |
| Peterborough | F. C. McRae | Norwood. |
| Prince Edward | A. P. MacVannel | Picton. |
| Rainy River | H. M. McElroy | Emo. |
| Renfrew | M. H. Winter | Renfrew. |
| Simcoe | J. Laughland | Collingwood. |
| Timiskaming | W. G. Nixon | New Liskeard. |
| Tunder Bay: | | |
| Fort William Section | G. W. Collins | Fort William. |
| Port Arthur Section | L. M. Davis | Port Arthur. |
| Victoria | A. A. Knight | Lindsay. |
| Waterloo | J. S. Knapp | Galt. |
| Welland | R. Austin | Welland. |
| Wentworth | R. L. Vining | Hamilton, 7 Market St. |
| York | J. C. Steckley | Newmarket. |

In addition to the above, temporary offices were opened in the Districts of Muskoka and Sudbury during the summer months.

## RURAL SCHOOL FAIRS

It is now two years since the School Fair movement became recognized as one of the important features of District Representative work in Ontario. There is probably no line of work undertaken by the District Representatives to-day which will have greater beneficial effect upon the future of the Agriculture of the Province. Parents and children alike, wherever the School Fair has been introduced, take a deep interest in the work, and it is also pleasing to note that the teachers in the rural schools and the school inspectors are rendering a service which cannot be overestimated.



Office, automobile and staff at the service of the farmers.

As an evidence of the popularity and growth of this movement, it might be stated that in 1912, the first year of the Fairs, there were 25 held, whereas in 1914 there were 148 fairs held in 37 counties, including the children in 1391 schools. There were 75,602 entries and a total attendance, including children and adults of 95,310. The number of plots cared for by the children on their home farms and inspected by the District Representatives was 23,872. 4,074 settings of eggs of the bred-to-lay strain of Barred Rocks were distributed, in addition to sufficient seed of the very best varieties obtainable to plant the plots referred to above. The following table will give some idea of the School Fair work in the various Counties:—

| County. | No. of Fairs. | No. of Schools included. | Attendance at Fairs. | No. of Entries. | No. of Plots. | No. of Settings of Eggs. |
|---|---|---|---|---|---|---|
| Algoma | 4 | 19 | 1,800 | 1,673 | 292 | 60 |
| Brant | 4 | 45 | 2,600 | 1,435 | 457 | 180 |
| Bruce | 3 | 33 | 3,200 | 2,086 | 502 | 159 |
| Carleton | 3 | 29 | 2,100 | 1,109 | 343 | 105 |
| Dufferin | 4 | 42 | 2,175 | 1,775 | 560 | 120 |
| Dundas | 3 | 41 | 2,050 | 2,000 | 694 | 119 |
| Durham | 5 | 59 | 3,450 | 3,475 | 756 | 194 |
| Elgin | 5 | 53 | 2,350 | 2,414 | 629 | 245 |
| Essex | 2 | 35 | 3,800 | 3,485 | 502 | 64 |
| Frontenac | 3 | 27 | 2,700 | 1,365 | 470 | 81 |
| Glengarry | 5 | 42 | 3.100 | 4,097 | 1,160 | 93 |
| Grey | 5 | 42 | 2,650 | 2,459 | 534 | 203 |
| Haldimand | 2 | 24 | 2,200 | 1,250 | 420 | 72 |
| Hastings | 3 | 30 | 2,000 | 1,843 | 415 | 36 |
| Kent | 5 | 53 | 2,550 | 1,256 | 670 | 121 |
| Lambton | 4 | 42 | 4,000 | 2,160 | 612 | 84 |
| Lanark | 4 | 31 | 2,100 | 1,926 | 568 | 162 |
| Leeds and Grenville | 5 | 42 | 3,600 | 2,200 | 365 | 137 |
| Lennox and Addington | 6 | 41 | 3.300 | 1,591 | 434 | 208 |
| Manitoulin | 5 | 36 | 1,550 | 1,750 | 638 | 60 |
| Middlesex | 4 | 44 | 5.800 | 2,150 | 885 | 130 |
| Norfolk | 3 | 39 | 2,700 | 3,448 | 639 | 156 |
| Northumberland | 3 | 24 | 1,800 | 1,550 | 448 | 51 |
| Ontario | 6 | 53 | 3,625 | 4,000 | 1,343 | 158 |
| Oxford | 2 | 21 | 1,300 | 950 | 540 | 44 |
| Peel | 4 | 27 | 2,200 | 2,600 | 626 | 139 |
| Peterborough | 3 | 30 | 1,675 | 1,575 | 521 | 89 |
| Prince Edward | 7 | 77 | 4,300 | 2,783 | 1,393 | 141 |
| Rainy River | 3 | 26 | 1,275 | 630 | 279 | 78 |
| Renfrew | 3 | 23 | 1,900 | 1,520 | 485 | 66 |
| Simcoe | 5 | 50 | 3,450 | 1,797 | 938 | 150 |
| Thunder Bay | 1 | 5 | 110 | 66 | 36 | 25 |
| Temiskaming | 2 | 14 | 750 | 239 | 203 | 36 |
| Victoria | 11 | 62 | 3,650 | 4,390 | 2,630 | 100 |
| Waterloo | 3 | 26 | 1,600 | 846 | 405 | 89 |
| Welland | 2 | 20 | 1,000 | 1,700 | 334 | 85 |
| York | 6 | 84 | 4,900 | 4,009 | 1,146 | 334 |
| Totals. | 148 | 1,391 | 95,310 | 75.602 | 23,872 | 4,074 |

## A SAMPLE SPEECH

The method of organization and the general outline of the School Fair movement has been so fully outlined in my reports for 1912 and 1913 that a repetition of such detail seems hardly necessary at this time: there are, however, several important features worthy of mention. At several of the fairs this year a public speaking contest was held, and it was exceedingly encouraging to find so many of the boys and girls show their willingness to enter this competition, and even more pleasing to note the remarkable manner in which many of these juvenile orators conducted themselves before audiences varying from 500 to 1,000 people. The following speech is the one which carried off the prize at a rural fair in Durham County:

*Ladies and Gentlemen*: This is our third School Fair, but it is the first year we boys and girls have had a chance to try to make a speech. We have been trying all kinds of things for this Fair, as you will see from what is shown here to-day. I suppose the next thing after learning how to do a thing is to learn to tell how it is done. So you see I am up here to try my first speech, and I do not think I ought to tire you as I have only three minutes to speak.

The first Fair was very different from the one to-day. The first and second Fairs were both held at Whitfield's School as it was the most central. They put tents up in the yard for the things to be judged in. The first year eggs were the only thing that had been given out by the Department; but last year, there were eggs, potatoes, oats, barley and corn given out, and prizes were given for essays, weed seeds, apples and several different kinds of sewing and baking. The day of the Fair was fine so there was quite a large crowd of people there. This year you can see for yourself what it is like and what an improvement it is on the last two years. Now, I suppose some of you will be wondering what good all this is going to do. Well, I can only speak for myself. You know, it seems a lot easier to remember how things are done when you have done them yourself. When I took my oats home I wanted to know which was the best field to sow them in, for I wanted to have the best oats if I could. Then after they were sown I kept watching them and the rest of the farm to see if they could have been any better in some other field. I learned something about what kind of land oats do best on, and besides that, the rest of the people were watching to see if the seed I got from the Department of Agriculture was going to yield any better than the kind they had. So you see they learned a little, too. In raising my chickens, I followed the rules the Department had sent, and of course, it was just the same with the chickens as it was with the oats. The people were watching to see if my

Youthful orator at a School Fair.

way was any better than their way, and I do not believe they would have ever looked at rules at all if I had not been using them for my chickens. Then I found out quite a bit about weed seeds when I was trying to get a collection of weed seeds. We had to find the weed, then watch it to see when it went to seed, so we got to know all about it before we were through and more than I learned, too, about them, for when I found a weed that I did not know I kept asking till I found someone who did know.

So, ladies and gentlemen, if you hear anyone saying that this Fair is just a waste of time and money, you just tell them that it is making us learn a lot of things we do not get at school, and things we will need to know when we leave school and start on the farm, just as much as we need Geography and Grammar and such things. It will not be long till we boys will be the farmers, and then we will thank Mr. Duncan for the trouble he has taken. Now I think my time is up. Thanking you for your attention, I will leave my place for someone else.

## INSPECTION OF PLOTS

Another important feature of the School Fair Work, and one which involves a great deal of work and careful attention, is the inspection of the children's plots during the growing season. As a special inducement for the children to follow the instructions of the Department, prizes are awarded for the best kept plots. The following is a sample score card used by District Representatives:

ONTARIO DEPARTMENT OF AGRICULTURE

.....County Branch

HOME PLOT COMPETITION

Score Card

Name of Pupil.....
P.O. Address .....
Township.....
School Section .....
Teacher .....

| | Possible Score. | Judge's Score. |
|---|---|---|
| 1. General appearance: | | |
| (a) Vigour and uniformity of growth ..... | 10 | ..... |
| (b) Stand of Plants..... | 5 | ..... |
| (c) Care in laying out plots and seeding ..... | 20 | ..... |
| 2, Freedom from weeds ..... | 25 | ..... |
| 3. Freedom from insects, blight, rust, smut, etc..... | 15 | ..... |
| 4. Cultivation and general care during summer ..... | 25 | ..... |
| Total ..... | 100 | ..... |

Instructor's Remarks:

Date.....

At the time of judging the plots, chickens were also inspected. The form used was as follows:

ONTARIO DEPARTMENT OF AGRICULTURE

.....County Branch

POULTRY

Score Card

Name of Pupil.....
P.O. Address .....
Township .....
School Section .....
Teacher.....

1. No. Hatched .....
2. No. Alive .....
3. No. off type .....
4. No. Cockerels .....
5. No. Pullets .....

Remarks:

Date.....

This inspection enables the District Representative to keep closely in touch with each child's work and to render timely assistance in regard to cultivation, and combating insect pests and plant diseases. It also affords the District Representative an opportunity of getting the parents interested in new methods and of becoming more closely acquainted than he could in any other way.

One of the most striking evidences of the popularity of the School Fair movement is the liberal way in which the School Boards, Township and County Councils and local organizations lend their financial support to this work. All the expenses connected with this work, with the exception of the prize money, are defrayed by the Department of Agriculture. The prize money is entirely dependent on local funds and with very few exceptions the contributions from various sources have been sufficient.

These bright-looking Boys and Girls make up the Executive of one Rural School Fair.

It has been the desire of the Department from the beginning to have the children look upon the School Fair as a children's organization; to accomplish this object, they are held separate and distinct from township or county agricultural fairs. Where they have been held previously in conjunction with other fairs, the children's exhibits have undoubtedly attracted a great deal of attention, but the interest maintained by the children is not to be compared with the enthusiasm shown at a School Fair where the children are made to feel that they are responsible for the successful carrying out of the Fair.

### A SAMPLE PRIZE LIST

In order that the reader may have a keener appreciation of the nature and extent of a Rural School Fair, I give herewith a Prize List which is a good illustration of the Prize Lists of the various Fairs throughout the Province.

## PRIZE LIST

### Home Plots.

*Class 1—Potatoes, Davies' Warrior.*

(1)—Care of plot. Ten Prizes.
1st, 50c.; 2nd, 45c.; 3rd, 40c.; 4th, 35c.; 5th, 30c.; 6th, 25c.; 7th, 20c.; 8th, 15c.; 9th, 10c.; 10th, 5c.

(2)—Best Peck Potatoes from plot. Ten Prizes.
1st, 50c.. 2nd, 45c.; 3rd, 40c.; 4th, 35c.; 5th, 30c.; 6th, 25c.; 7th, 20c.; 8th, 15c.; 9th, 10c.; 10th, 5c.

*Class 2—Mangels Ideal.*

(1)—Care of plot. 1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.
(2)—Best 12 Mangels from plot.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 3—Field Corn, Wisconsin No. 7.*

(1)—Care of plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.
(2)—Best Ten Selected Stalks with Ears from plot.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 4—Sweet Corn, Golden Bantam.*

(1)—Care of plot.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.
(2)—Best Twelve Ears from plot.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 5—Barley O.A.C. No. 21.*

(1)—Care of plot.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.
(2)—Threshed Grain from plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 6—Oats, O.A.C. No. 72.*

(1)—Care of plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.
(2)—Threshed Grain from plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 7—Sweet Peas and Flowers.*

(1)—Care of plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Best Bouquet of Flowers, any kind—(Open only to pupils taking Sweet Peas.)
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

*Class 8—Best Half-Bushel Potatoes, any Variety, Grown by Exhibitor.*

1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

### Poultry.

*Class 9—Barred Plymouth Rocks.*

(1)—Best Flock—Any Number, Cockerels or Pullets, exhibited by one pupil.
1st, 75c.; 2nd, 50c.; 3rd, 35c.; 4th, 25c.

(2)—Best Pen of 4 Birds. 1 cockerel and 3 pullets.
1st, 50c.; 2nd, 40c.; 3rd, 30c.; 4th, 20c.

(3)—Best Single Cockerel—
1st 40c.; 2nd, 30c.; 3rd, 20c.; 4th, 10c.

(4)—Best Single Pullet—
1st, 40c.; 2nd, 30c.; 3rd, 20c.; 4th, 10c.

(5)—Best pair, cockerel and pullet.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

School Fairs provide some fun as well as work for the boys.

*Class 10—Spring Chickens.*

(1)—One Male and Two Females, any variety.
Open to pupils not exhibiting in Class 9.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Best Pair Crate-Fattened Spring Chickens (alive), any variety.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

LIVE STOCK.

*Class 11.*

(1)—Best halter-broken colt. Pure bred or grade, born after Jan. 1st, 1914. To be handled by exhibitor.
1st, $1.00; 2nd, 75c.; 3rd, 50c.; 4th, 25c.

(2)—Best halter-broken Calf. Pure bred or grade, borne after Jan. 1st, 1914. To be handled by exhibitor.
1st, $1.00; 2nd, 75c.; 3rd, 50c.; 4th, 25c.

DOMESTIC SCIENCE.

*Class 12—Baking and Sewing.*

(1)—Best Two Loaves Home-made Bread in pans, about 7in. by 4in. by 3in.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Best Half-dozen Baking Powder Biscuits.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—Best Layer Cake—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(4)—Best Chocolate Pie—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(5)—Best Tray Cloth, drawn work—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(6)—Best Hemstitched Handkerchief—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(7)—Best Fancy Apron, hand made—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

MANUAL TRAINING.

*Class 13.*

(1)—Best Milk Stool—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Best Tool Box—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—Best Chicken Coop—
1st, 50c.; 2nd, 35c.; 3rd, 25c., 4th, 15c.

NATURE STUDY.

*Class 14—Weeds, Seeds, Flowers.*

(1)—Best Collection of Weeds, pressed, mounted and correctly named—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Best Collection of Weed Seeds, correctly named—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—Best Collection of Insects, correctly named with common name—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(4)—Best Collection of the work of Insects and Plant Diseases—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(5)—Best Collection of Wild Flowers, named—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

RECORDS OF WORK.

*Class 15—Essays.*

(1)—Essay on "How I Grew My Plot." Open to pupils of grades below Sr. III—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2) Essay on growing "Potatoes," "Mangels," "Corn," "Barley," "Oats," "Sweet Peas," or "Rearing Chickens."

—and also for the girls.

This Essay need not be confined to knowledge gained from your own plot, but may be more general in character.
Open to pupils of grades Sr. III, and above.
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—Best Report Sheet regarding notes on plot—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

FRUIT.

*Class 16.*

(1)—5 Spy Apples—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—5 Snow Apples—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—5 A.O.V. Apples—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

RULES.

PLEASE READ CAREFULLY.

1. Competition for prizes offered in the following list is open to pupils of those Schools who have carried on the Agricultural Work in 1914, as directed by the Durham Branch of the Department of Agriculture at Port Hope.
2. The entire crop must be exhibited unless otherwise stated. All birds reared must be exhibited.
3. No entry fee will be charged for any exhibit.
4. Exhibitors in Poultry Classes must supply their own coops.
5. All exhibits must be the property or the work of the exhibitor.
6. All entries must be made to the Chairman of your School Committee not later than September 15th.

Growing Oats as tall as the grower.

CONTESTS.

*Class 17.*

(1)—3-minute Address on any agricultural subject—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(2)—Girls' Sewing Competition (work 1 button-hole)—
1st, 50c.; 2nd, 35c.; 3rd, 25c.; 4th, 15c.

(3)—Boys' Tug-of-War Contest. Teams of Four Boys from each School—
1st, $1.00.

7. All exhibits relative to classes 1, 2, 3, 4, 5, 6, 7, 9, must be the product of materials supplied by this Department. All other exhibits must be collected or made by the exhibitors.
8. All articles for competition at the School Fair must be in place in the tent supplied by this Department not later than 11 o'clock a.m. The committee of each school will have charge of the placing of the school's exhibit, and the rural school Fair Board will supervise the work generally, settle all disputes, etc. The ruling of the executive committee will be final in every case.

## COURSES IN AGRICULTURE

Each year brings an added interest in the Courses in Agriculture for farmers' sons, conducted by the District Representative. This is indicated by the increase in attendance and the growing demand for these Courses. During the past few years these Courses were held in the town where the District Representative was located but experience has demonstrated the wisdom of holding them in a different section of the County each year in order that farmers' sons may be afforded an opportunity to receive instruction and at the same time attend to their duties on the farm. In a few instances Courses have been held in the High Schools and the High School teachers in every case have rendered valuable assistance in the way of giving lectures in English, Mathematics, Physics and Bookkeeping. In the

Here is a fine class of boys from the country taking advantage of the opportunity afforded by the local six weeks' course in Agriculture.

majority of cases, however, the town hall or some large room is rented and equipped temporarily for the work. These Courses in Agriculture had a very modest beginning in Victoria County in 1908 when six students were in attendance. Since that time the attendance has steadily increased from year to year; this year there were 30 Courses held with a total attendance of 555.

The following outline of the work covered by one of these Courses in Agriculture will serve to illustrate the varied and practical nature of these Courses:

LIVE STOCK.

History and Characteristics of breeds of Horses, Cattle, Sheep and Swine; Records and Pedigrees; Judging—including visits to local Stock Farms; Use of the Score Card: Feeding and Management; Construction of Farm Buildings.

FARM CROPS.

Varieties of Farm Crops; Methods of Crop Improvement; Seed Selection; Judging Grain; Rotation of Crops; Special Study of Corn and Alfalfa.

SOILS—

Classification of Soils; Food Requirements; Fertilizers; Methods of Cultivation; Underdrainage.

FRUIT GROWING—

Location of Orchards; Nursery Stock; Planting; Pruning with Practice in Orchards in this vicinity; Spraying; Making up Solutions; Cover Crops; Picking and Marketing Fruit; Box and Barrel Packing; Small Fruits; The Farmer's Garden.

WEEDS AND INSECTS.

Characteristics and Methods of Combating these pests.

POULTRY.—

Breeds, Management, Housing, Feeding, Hatching and Rearing, Crate Fattening.

VETERINARY SCIENCE.—

Causes, Symptons and Treatment of Common Ailments of Farm Animals.

DAIRYING.—

Types of Milk Cows, Feeding for milk production, Milk records; The Babcock Test.

BACTERIOLOGY.

Study of bacteria in soil, milk, water, silage, bacterial diseases.

SPECIAL WORK.—

Farm Arithmetic and Bookkeeping, Public Speaking, Debates and Literary Work.

While the nature of the Courses vary in a slight degree depending on the class of farming practised in each particular district, they are, in the main, practically the same. Special attention, however, is always given to those subjects which are considered of the most importance. At all times an effort is made to have the Courses practical—demonstration is used as much as possible. Where it is desired to teach the characteristics of breeds and types of live stock, the students are taken to purebred breeders' farms, where they are given the opportunity of examining the animals and receive practical instruction in judging. Likewise, when receiving instruction in pruning fruit trees, the class is taken to a nearby orchard where trees are pruned by experts and the boys learn by doing.

A School Fair Flock.

A feature of the Courses probably even more important is the practice of the District Representative taking his class to Toronto, Guelph, or Ottawa, where they

have an opportunity of inspecting first-class stables and judging classes of stock that could not be secured for this purpose in their own district. In addition, Toronto affords an opportunity for the boys to inspect the stock yards, where they learn at first hand how all classes of live stock are received and distributed. From there they go to the abattoirs to study the various processes in the manufacture of meat products and fertilizers. During the past year several of the classes, numbering from 25 to 50 and ranging in age from 18 to 25, have called to see me at my office, and I have never seen a more intelligent class of young men attending any of our educational institutions. To see these young men is to be convinced that these Courses will have a very desirable effect upon Ontario's Agriculture.

### YOUNG FARMERS' MOVEMENT

One of the most encouraging results of the courses in agriculture is the bringing into existence of a movement that promises to become an important factor in moulding the agriculture of the Province. In the majority of cases the boys taking the Course in Agriculture have organized themselves into what is known as a "Junior Farmers' Improvement Association."

### CONSTITUTION GOVERNING THE JUNIOR FARMERS' IMPROVEMENT ASSOCIATION.

.....County

1. That this Society shall be known as the Junior Farmers' Improvement Association of the County of .....

2. The object of the Society shall be to create a deeper and more permanent interest in the agricultural life of the County:

(*a*) By the dissemination of agricultural learning among its members leading to improved farm methods.
(*b*) By conducting competitions, such as the "Acre Profit Competition," in the production of field crops.
(*c*) By conducting competitions, such as the "Baby Beef Competition," in the production of Live Stock.
(*d*) By arranging for Live Stock Competitions at the local Fall Fairs.
(*e*) By conducting simple experiments on the farm in cow testing, commercial fertilizers, spraying, pruning and thinning, underdrainage, apiculture, poultry, etc.
(*f*) By the introduction of better varieties of farm crops.

3. The officers of the Society shall consist of a President, Vice-President, Secretary-Treasurer, a Committee of Management and two Auditors.

4. The Society year shall commence the 1st day of March of each year.

5. The Society shall hold at least two meetings each year to be held in the County office of the Department of Agriculture.

6. The membership of the Society shall be limited to those men who take the annual six weeks' Course in Agriculture arranged by the local Department of Agriculture.

7. Each member shall be notified in writing of all meetings of the Society at least five days previous.

8. Ten members of the Society shall constitute a quorum for the transaction of business.

9. An annual membership fee of twenty cents shall be levied.

10. The Constitution of the Society may be amended by a majority vote at any regular meeting.

It will be seen that one of the qualifications for membership is that each member shall have had a Course in Agriculture under the District Representative or at the Ontario Agricultural College. It will also be seen from this that every member will have had special training in agriculture, making him specially fitted to carry on experimental work, etc., and under the guiding hand of the District Representative it is proposed that these Associations hold several meetings during the year at which times local problems will be discussed, results given of the year's work, and plans made for extension of the work. The following programme of a Junior Farmers' Meeting held recently will help to give some idea of the nature and possibilities of this work:

MORNING SESSION.

9.30—President's Address.
10.00—Address, "Farm Accounts." Discussion.
10.30—Impressions of Short Course at Guelph.
11.00—Points gained by Feeding Hogs Competition.
11.30—Points gained by Acre Profit Competition.

AFTERNOON SESSION.

2.00—The Use of Fertilizers. On Corn; On Potatoes; On roots.
2.30—Address: District Representative.
3.00—Points Gleaned at Short Course which are of use on the farm. Discussion.
3.30—Election of Officers for the year.

ACRE PROFIT COMPETITIONS

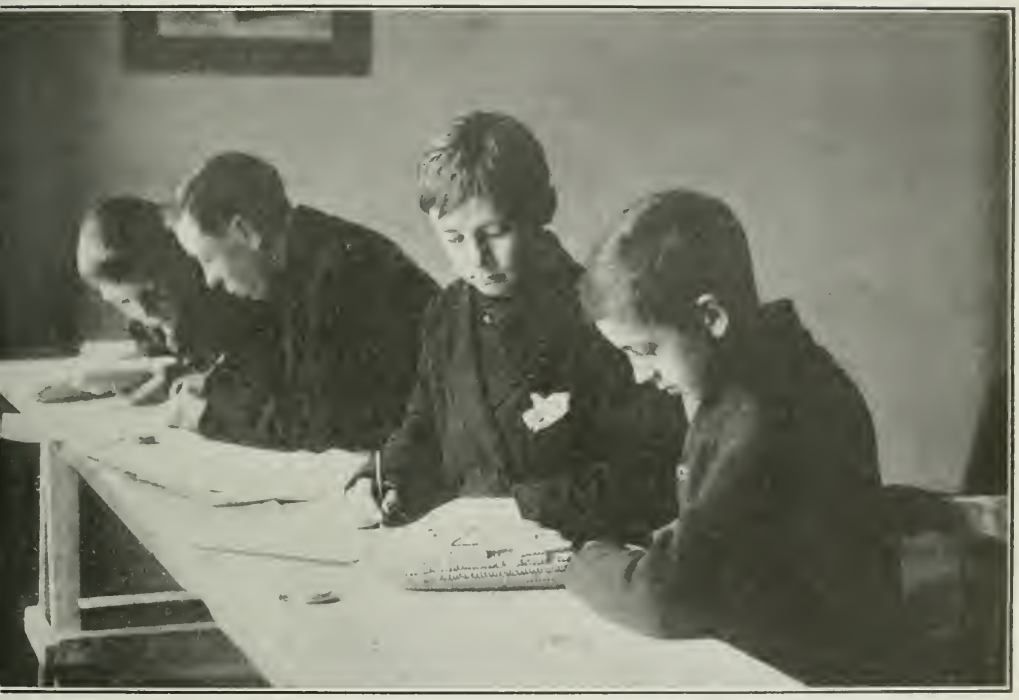
As was the case last year, the Acre Profit Competitions for 1914 have met with unqualified success. These competitions are open to farmers' sons who have taken Courses in Agriculture conducted by the District Representatives in their respective counties. The object of these competitions is first to demonstrate the possibilities of an acre of land from a financial standpoint, and secondly to demonstrate what may be accomplished by paying more careful attention to the quality of seed used and the thoroughness of cultivation. For this work, each county had a separate competition and the crop was selected by a vote of the competitors. One of the rules governing the competition is that there must be at least six entries, and where twelve or more entries are secured, two prizes are awarded. Two crops may be selected in each county if not less than five entries are secured for each crop with a total of twelve in both crops. The prize offered by the Department is a two-weeks Course in Live Stock and Seed Judging at the Ontario Agricultural College, Guelph, transportation and living expenses paid by the Department. In figuring the cost of production, $5.00 per acre was allowed for rent of land, 50c. a ton for manure applied in 1914, 15c. an hour for manual labor and 10c. an hour for each horse. Where commercial fertilizer was used one-half the actual cost was charged against the crops grown. In addition the actual cost of seed, spraying materials, etc., was included. In figuring the profits, the following values were put upon the crops:

Potatoes, 40c. per bushel.
Turnips, 15c. per bushel.
Mangels, 15c. per bushel.
Barley, 60c. per bushel.
Oats, 50c. per bushel.
Corn for silage, $2.75 per ton.
Corn for seed, $1.00 per bushel.

*The following table gives the results of the winners in each County:—

POTATOES

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Brant | Shirley C. Davis, Brantford | 239 bus. | $23 67 | $69 49 |
| | Clay loam, following sod, farmed 75 years, 7 loads manure, Paris Green, Sir Walter Raleigh. | | | |
| Bruce | Wm. J. Crawford, Walkerton | 415½ | 45 03 | 120 02 |
| | Sandy loam, following oats, farmed 24 years, 10 loads manure, Paris Green, Pearl of Savoy. | | | |
| | C. L. Lamb, Walkerton | 325 | 44 80 | 84 00 |
| | Sandy loam, following buckwheat, farmed 50 years, 17 loads manure, Paris Green Pearl of Savoy. | | | |



Boys studying corn at the Corn Show.

| | | | | |
|---|---|---|---|---|
| Dufferin | Jas. D. L. Crombie, Mono Mills | 323½ | 32 80 | 96 65 |
| | Clay loam, following pasture, farmed 50 years, 12 loads manure, Paris Green, Early Rose. | | | |
| | Russell R. Oliver, Waldemar | 293 | 28 49 | 87 77 |
| | Clay loam, following rape, farmed 15 years, 11 loads manure, Paris Green, Delaware. | | | |
| Durham | Reginald I. Fallis, Millbrook | 312 | 36 96 | 86 34 |
| | Clay loam, following oats, farmed 75 years, 15 loads manure, 200 lbs. potash and phosphate, Bordeaux, Carmen No. 1. | | | |
| Leeds and Grenville | Hayden H. Hayes, Athens | 288 | 38 08 | 76 60 |
| | Clay loam, following hay, farmed 30 years, 10 loads manure, Bordeaux, Green Mountain. | | | |

Middlesex ..... Campbell Lamont, Mount Bridges..501 32 62 167 18
Sandy loam, following sod, farmed 60 years, 15 loads manure, seed hill selected for five years, Bordeaux mixture, Paris green and arsenate of lead, Dooley.

Norfolk ..... W. G. Johnstone, Vittoria .....208 27 75 49 85
Sandy soil, following clover, farmed 40 years, 10 loads manure, Rural New Yorker.

Northumberland .....Maurice Herrington, Hilton .....385 46 15 105 85
Clay loam, following sod, 12 loads manure, farmed 15 years, Paris green and arsenate of lead, Carmen No. 1.

Ontario .....Chas. E. Broughton, Whitby .....259 37 82 64 51
Sandy loam, following oats, farmed 75 years, 600 lbs., Potato Special 2-8-10, Bordeaux and arsenate of lead, Empire State.

Oxford .....Nelson Innes, Bright .....330 60 82 70 18
Clay loam, following pasture, Paris green, Admiral Dewey.

Rainy River .....O. Cameron, Emo .....410 58 30 99 70
Sandy loam, following clover, farmed 4 years, 20 loads manure, Paris green, Delaware.

Simcoe .....Geo. D. Coutts, Midhurst .....403 37 10 116 15
Sandy loam, following wheat, farmed 50 years, 12 loads manure, Paris green, Beauty of Hebron.

Simcoe .....Ira O. Partridge, Barrie .....376 36 10 111 10
Clay, following oats, farmed 40 years, 15 loads manure, Paris green, Clark No. 1.

Welland .....Geo. Moore, Forks Road .....320 60 33 62 07
Clay, following wheat, farmed 50 years, 16 loads manure, 175 lbs. 4-6-10 fertilizer, Paris green and Bordeaux, Delaware.

## OATS

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Carleton ..... | Alfred Denison, Pana ..... | 83 bus. | $10 93 | $30 57 |
| | Clay loam, following corn, farmed 4 years, Banner registered. | | | |
| Dundas ..... | Blake Nephew, Finch ..... | 82 | 13 67 | 27 33 |
| | Clay loam, following pasture, farmed 12 years, O.A.C. 72. | | | |
| | Wm. B. Hamilton, Chesterville ..... | 86 | 15 70 | 25 30 |
| | Clay soil, following corn, farmed 60 years, O.A.C. 72. | | | |
| Frontenac ..... | Russel Shillington, Harrowsmith ... | 59½ | 13 08 | 16 67 |
| | Clay loam, following potatoes, farmed 60 years, Banner. | | | |
| | J. W. Orr, Glenburnis ..... | 48 | 11 75 | 12 25 |
| | Sandy loam, following potatoes, farmed 75 years, Banner. | | | |
| Haldimand ..... | Lester Strohm, Decewsville ..... | 70 | 16 57 | 18 43 |
| | Clay, following corn, farmed 60 years, Silver Mine. | | | |
| Lanark ..... | Cecil Owens, Kinburn ..... | 76 | 10 42 | 28 68 |
| | Clay loam, following sod, farmed 50 years, Banner. | | | |
| | H. Smith, Pakenham ..... | 75¼ | 11 20 | 25 42 |
| | Clay loam, following roots, 90 years farmed, Banner. | | | |

| | | | | |
|---|---|---|---|---|
| Middlesex | Arthur Pincombe, Strathroy | 70 | 12 38 | 22 62 |
| | Clay loam, following mangels, farmed 50 years, 18 loads manure, Siberian. | | | |
| Muskoka | Alvin A. Goltz, Bardsville | 82 | 11 08 | 29 92 |
| | Clay loam, following sod, farmed 13 years, Improved Scotch. | | | |
| Peel | J. C. Salisbury, Brampton | 73 | 13 50 | 23 00 |
| | Clay loam, following potatoes, farmed 75 years, O.A.C. 72. | | | |
| York | Angus Cowieson, Queensville | 76 | 10 30 | 28 70 |
| | Clay loam, following mangels, farmed 70 years, Rennie's Earliest. | | | |
| | Raymond Morton, Keswick | 69½ | 12 23 | 22 52 |
| | Clay loam, following mangels, farmed 75 years, White Wave. | | | |

## PEAS

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Thunder Bay | Ross McKenzie, Murillo | 38½ bus. | $23 50 | $53 50 |
| | Clay loam, following barley, farmed 30 years, 14 loads manure, Canadian Beauty. | | | |

## TURNIPS

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Renfrew | Wm. Ryan, Renfrew | 1,016 bus. | $26 80 | $74 80 |
| | Sandy loam, following potatoes, farmed 80 years, 4 loads manure, Rennie's Prize. | | | |
| Victoria | G. F. Manning, Woodville | 1,090 | 28 30 | 80 70 |
| | Clay loam, following mangels, farmed 30 years, 13 loads manure, Canadian Gem. | | | |

## MANGELS

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Peterborough | Thos. Collyer, Norwood | 681½ bus. | $30 80 | $50 98 |
| | Clay loam, following peas and oats, farmed 50 years, 11 loads manure, Yellow Leviathan. | | | |

## CORN FOR SEED

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Essex | Tyler Humber, Cottam | 95 bus. | $13 70 | $81 30 |
| | Black loam, following sod, new land, Bailey. | | | |
| | Forest J. Adams, Arner | 90 | 12 55 | 77 45 |
| | Sandy loam, following clover sod, farmed 50 years, Bailey. | | | |
| Lennox and Addington | Leo Flynn, Tamworth | 105½ | 32 45 | 73 19 |
| | Clay soil, following clover sod, farmed 95 years, 30 loads manure, Longfellow. | | | |
| | John J. Kearns, Tamworth | 65 | 20 90 | 44 23 |
| | Clay loam, following clover sod, farmed 40 years, 10 loads manure, Longfellow. | | | |

These are the boys who won in the Acre Profit and Hog-feeding competitions and received all expenses while attending short course at the O. A. C.

CORN FOR SILAGE

| *County.* | *Winner.* | *Yield.* | *Cost Prod.* | *Profit.* |
|---|---|---|---|---|
| Grey | Wilford R. Graham, Markdale | 20.75 tons | $18 03 | $39 17 |
| | Sandy loam, following clover, farmed 50 years, 10 loads manure, White Cap Yellow Dent. | | | |
| Manitoulin | Ray Jennings, Barrie Island | 24.50 | 12 40 | 55 03 |
| | Clay loam, following sod, farmed 30 years, White Cap Yellow Dent. | | | |
| | John Williamson, Mindemoya | 19 | 23 95 | 28 30 |
| | Clay loam, following carrots, farmed 12 years, 10 loads manure, Australian White. | | | |
| Norfolk | Delbert Butler, Simcoe | 17.35 | 18 07 | 29 67 |
| | Clay loam, following pasture, farmed 60 years, 8 loads manure, 250 lbs. 2-8-10, Leeming. | | | |
| Oxford | Allistor Innes, Bright | 26.60 | 15 27 | 58 76 |
| | Clay loam, following old pasture, farmed 80 years, 6 loads manure, Longfellow. | | | |
| Prince Edward | Whytock Fox, Bloomfield | 20.80 | 16 81 | 40 72 |
| | Sandy loam, following tomatoes, farmed 100 years, 14 loads manure, Wisconsin No. 7. | | | |

*It will be noted that the winner is the one who shows the highest profit, not merely the biggest yield. This takes the cost of production into consideration. In many places, especially across the line, there have been competitions where the prize has been awarded to the biggest yield, and it was found that this was often secured at a cost which made profit impossible. We have endeavoured to avoid that mistake in these competitions.

It will be seen from the foregoing that 47 farmers' sons were prize-winners in these competitions. These represent 36 competitions in 32 counties, in which 198 young men were competing. The most noticeable feature of the tabulated results is the yield produced by the winners of these various crops, as compared with what we know to be the average yield produced on the average farm in Ontario. Especially noticeable is the yield of 501 bushels potatoes in Middlesex County at a cost of $32.62 and with a net profit of $167.18. It might also be interesting to point out that the average net profit of the five coming highest in the potato competition amounted to $124.06, and even the five lowest had an average net profit of $63.22. Of the thirteen winners in oats, the average yield was 73 bushels per acre, produced at a cost of $12.52 with a profit of $23.95. The average net profit of the five highest amounted to $29.04 and that of the lowest five was $18.49. The competitions conducted in turnips, mangels, corn for seed, corn for silage show results in every way as remarkable as the foregoing, and emphasize the need for closer attention to the preparation and cultivation of the soil and the selection of the seed.

FEEDING HOGS FOR PROFIT COMPETITION

After the hearty response to the announcement of the Acre Profit Competition, it was decided to conduct a Feeding Hogs for Profit Competition, which should be open to the same class of boys as the former; the rules governing the entries and the prizes to be the same as in the field crop competition. The boys were required to select hogs six weeks of age, and a value of $1.00 was placed on them

at that age. Contestants were allowed to select four and finish with three. They were fed until 26 weeks of age and a record kept of the amount of food used each week—special forms were supplied for this purpose. Fixed values were placed on the various kinds of food consumed. At the conclusion of the feeding period, the hogs were weighed and 15 per cent. was deducted for shrinkage and the value of the hogs estimated by a fixed price of 8½c. per lb. live weight. The prize was awarded by taking into consideration both the average net profit of the three hogs fed and the type—50 per cent. being allowed for each, and the regular bacon hog score card being used for scoring the type. The following are the winners in each county:—

Pigs which won a free course for their young feeder.

| County. | —— | Breed, | Average Cost Production. | Average Value, | Average Profit. |
|---|---|---|---|---|---|
| | | | $ c. | $ c. | $ c. |
| Brant | C. H. Summerby, Paris | Yorkshire | 10 83 | 14 59 | 3 75 |
| Bruce | Thos. G. Smith, Walkerton | Yorkshire | 13 51 | 17 67 | 4 16 |
| Carleton | Garnet Howes, Metcalf | Yorkshire | 13 48 | 20 65 | 7 17 |
| Eufferin | Sam. Bradford, Amaranth | Yorkshire | 12 60 | 21 53 | 8 93 |
| Durham | H. Earle, Ida | Yorkshire | 11 56 | 20 04 | 8 48 |
| Essex | Russell O'Neil, Paquette Station | Duroc | 11 51 | 21 45 | 9 94 |
| Frontenac | H. Moreland, Harrowsmith | Yorkshire & Tamworth Cross | 15 62 | 21 50 | 5 88 |
| Grey | Carl Atkinson, Rock Mills | Yorkshire | 12 04 | 23 60 | 11 56 |
| Haldimand | Elmer Windecker, Cayuga | Yorkshire & Duroc Cross | 10 56 | 18 64 | 8 08 |
| Lambton | Roy Goudie, Petrolia | Yorkshire | 15 00 | 20 18 | 5 03 |
| Manitoulin | Archie Campbell, Foxey | Yorkshire | 13 04 | 18 57 | 5 53 |
| Norfolk | W. Myerscough, Bealton | Tamworth and Berk Cross | 12 79 | 21 62 | 8 83 |
| Ontario | Lorne Barton, Uxbridge | Yorkshire | 13 39 | 19 40 | 6 01 |
| Oxford | Glen Topham, Burgessville | Chester White | 9 38 | 20 63 | 11 26 |
| Peel | M. D. Monkman, Brampton | Yorkshire | 11 80 | 18 41 | 6 61 |
| Peterboro' | Ambrose English, Norwood | Yorkshire | 10 12 | 16 83 | 6 71 |
| Rainy River | Percy Locking, Emo | Yorkshire | 13 26 | 17 76 | 4 50 |
| Simcoe | Cecil Robertson, Barrie | Yorkshire | 11 76 | 17 75 | 5 99 |
| Victoria | Austin Reid, Reaboro | Yorkshire | 11 07 | 14 59 | 3 52 |
| York | Victor Marchant, Lloydtown | Yorkshire | 9 82 | 15 90 | 6 08 |

Altogether there were 20 competitions, representing 20 counties and 85 competitors in all. The average net profit of the 20 winners was $6.40 per hog, while the average of the first five winners was $10.10 per hog and of the lowest five $4.55.

## PURE BRED LIVE STOCK CENSUS

While Ontario is recognized as the centre of pure-bred live stock breeding, the Department has felt for some time the need of definite information as to the actual number of animals of the different breeds and the names and addresses of farmers devoting their attention to this important industry. With this end in

view the District Representatives were instructed to make a careful survey of their counties in order to secure the desired information. Names of breeders were secured from entry lists at fall fairs and from various other sources, and from this information lists were prepared and a copy sent to each breeder with a request to add the names of any in their district not included in the list, and to return to the District Representative's office. While this entailed considerable amount of detail, it is safe to say that the census taken will be complete for all practical purposes. A number of the census returns are being tabulated and separate reports for each county published. In several instances these reports are ready for distribution. It is hoped that by means of this census the small breeder will be brought more into prominence and the District Representative will be able to follow the development of pure-bred live stock breeding more closely than was

Judging the Colts at a School Fair.

possible without this information. It has already been effective in bringing together farmers interested in the same breeds of live stock, and in many instances steps are being taken to organize Breeders' Clubs, which will undoubtedly do much to advertise their respective districts as pure bred live stock centres.

## REFORESTATION

In practically every county in the Province the necessity of paying more attention to reforestation is being more apparent, in fact, there are few farms, especially in the mixed farming districts, where a portion of the farm could not be profitably devoted to forestry. There are many large tracts of land unsuited to agriculture which it is hoped will be in time devoted to this important industry.

In order to encourage farmers in this work the Government is supplying free planting material. This special inducement is offered so that demonstration forest plantings may be started throughout the Province. It is anticipated that these forest plantations will be of an educational value in illustrating the possibility of reforesting non-agricultural soils. Circulars, bulletins, and information

may be obtained by applying to the Forestry Branch, Parliament Buildings, Toronto.

The District Representatives in several counties have done much to bring this matter to the attention of the farmers and in several instances with very encouraging results. The following statement of the work done in Simcoe County will serve as an example:—

"To demonstrate what can be done in reforesting, we co-operated with W. J. Holden, Ottawa, and in the spring of 1913 planted 16,000 trees on four acres of sandy land. Twelve thousand of these trees were alive at the beginning of the second year, and the gaps left by the dead trees were re-planted. During the summer months the trees made excellent growth and gave every indication of demonstrating the possibilities of waste land when devoted to forestry purposes."

Reforesting sandy lands in Simcoe County.

## TESTING VARIETIES OF CORN FOR SILAGE

Not so many years ago many farmers were somewhat skeptical as to the value of silage as a feed for stock, but each succeeding year has added to the popularity of this important feed, until to-day the silo is recognized to be of vital importance in the economical feeding of live stock. One of the difficulties confronting many of our farmers has been to secure a variety of corn adapted to local conditions and also to secure seed of a high germinating power. District Representatives have done much in getting farmers in touch with reliable sources of seed of first-class quality, and have advocated, with a fair amount of success, the purchasing of kiln-dried seed corn on the cob. The question of deciding on the variety to recommend has not been as easy a problem, for while certain standard varieties were generally recognized as desirable, no definite information was available as to their relative values. District Representatives in ten counties were supplied with sufficient seed corn of eight standard varieties to seed eight acres. Instructions were given to select eight farmers in different sections of their re-

spective counties and have them grow the eight varieties, side by side, on one acre of land. During the summer months these fields were carefully inspected as to growth of stock, size of leaf, number and size of ears, freedom from disease, date of maturity, yield per acre, etc. While the information secured is interesting and valuable, plans are being made to continue this work for three years, and also to extend the work to include practically every county in the Province. Seed has been carefully selected for this purpose, and with the general interest taken in this experiment by farmers in sections where the work has been started, the Department feels assured that this experiment will do much towards solving the problem of varieties of corn.

## ARMY WORM

During the first and second weeks of July the Army Worm made a very unexpected appearance and for a time promised to be a very serious pest. The outbreak was very general. In fact practically every county and district in the Province was more or less affected. However, through the untiring and systematic efforts of the District Representatives throughout the Province, in co-operation with other Department officers and the farmers, the Army Worm was promptly checked and its ravages reduced to a minimum. Probably nothing has done more to help the farmers appreciate the value of having a District Representative to whom they may appeal for assistance. Just as soon as the pest made its appearance and demonstrated its ability as a destroyer of farm crops, appeals for assistance were directed to the Branch Office of the Department of Agriculture. The response was prompt, the men working night and day for a time. For example, in one county in responding to such a call the District Representative found 50 farmers together on the roadside eager for information as to the best methods of eradicating the pest. In another instance a public meeting was held and attended by 300 farmers who had come for like instruction. At all these meetings the life history and habits of the Army Worm were described and instruction given as to the most effective methods of eradication. The practice most generally adopted was simply to plow a deep furrow, cutting off the advance of the worms from the affected to the unaffected areas, digging post-holes at intervals into which the worms would collect and be destroyed. While the actual loss from the outbreak of the Army Worm probably did not exceed $100,000 or $200,000, it is quite generally recognized that the prompt action taken by the District Representatives in combating the pest was the means of saving many thousands of dollars to the farmers of Ontario. A similar outbreak in one of the states across the line is stated to have done damage to the extent of $1,000,000.

Trench warfare in Ontario against the army worm.

### GRASSHOPPERS

While the grasshoppers are always in evidence, they are not (taking the Province as a whole) in sufficient numbers to cause any great alarm. However, there are certain areas and districts, particularly those of a sandy nature, where conditions are favorable to this insect, and as a result they are one of the most serious pests which a farmer has to combat. In years particularly favorable to this insect they multiply very rapidly and would seem to devour everything in their trail. Several remedies have been suggested, but the one that proved to be the most effective was demonstrated in Carleton County. The formula of the mixture is sufficient for 20 acres as follows:—

100 lbs. Bran
4 lbs. Paris green
5 qts. Molasses
15 Lemons

The materials should be thoroughly mixed together in a dry state and enough water and lemon juice added to make the mixture crumble in the hand. The Paris green may be mixed with the water to avoid the dust if so desired. For the demonstration 400 acres were treated. The mixture was applied by hand early in the morning. Several days after the application was made, the area treated was carefully inspected and the results were found to be beyond the most sanguine expectations. The following table will serve to illustrate the effectiveness of this treatment:—

| Number of acres. | Nature of land. | Number of insects per square yard in | | | | |
|---|---|---|---|---|---|---|
| | | Pasture. | Oats. | Rye. | Corn. | Roads. |
| 100 | Sandy | 60–75 | 50–90 | 10–20 | ..... | 60–70 |
| 100 | " | ..... | 75–120 | ..... | ..... | ..... |
| 75 | " | ..... | ..... | ..... | 10–31 | ..... |
| 50 | " | ..... | 50–60 | ..... | ..... | ..... |
| 75 | " | ..... | 75–90 | ..... | 15–45 | 60–70 |
| 400 | Average killed per square yard.. | | 50 | | | |

Similar experiments were conducted at the Experimental Farm, Ottawa, with even more encouraging results—the dead insects numbering from 240-400 per square yard. The reason for the greater number of dead insects in the second case was due to the fact that the poison mixture was applied in an early stage of the grasshoppers' development. The poison should always be applied while the grasshoppers are in the hopping stage, as it is much more difficult to treat them after they have developed wings.

### ALFALFA SEED

One of the greatest handicaps in the growing of alfalfa in Ontario has been the difficulty in securing seeds of hardy strains. Many farmers have taken great pains in the preparation of the seed-bed, etc., and have secured an excellent stand of plants only to find them killed out the first year. This is almost invariably due to the use of cheap imported seed, not suited to our conditions. Results of experiments at the college have demonstrated the importance of using hardy strains of either Grimm or Canadian Variegated seed, and the difficulty has been to secure

sufficient to supply the demand. With this in mind the District Representatives have been co-operating with the Experimental Department at Guelph in conducting experiments in growing seed of these varieties. For this purpose they have each been supplied with three pounds of first-class seed to be sown on one acre of land under the following conditions:—

(1) At least forty rods from any alfalfa field select one acre of land which has a good natural underdrainage, and preferably soil of rather a heavy character, elevated and sloping, and which is comparatively free from weeds and from weed seeds.

(2) Thoroughly cultivate the soil as early in the spring as the land is warm and dry enough to work to advantage.

A local Alfalfa Demonstration Plot with a splendid catch.

(3) Sow the three pounds of Grimm alfalfa seed in rows 30 inches apart as soon as possible after the land is cultivated, and while it has plenty of moisture.

(4) Cultivate between the rows occasionally, keeping the land free from weeds.

(5) In the spring of 1916 again cultivate the land thoroughly.

(6) On one-half of the land allow the first crop in the season to remain for seed, and on the other half use the first cutting for hay, and allow the second crop in the season to produce seed.

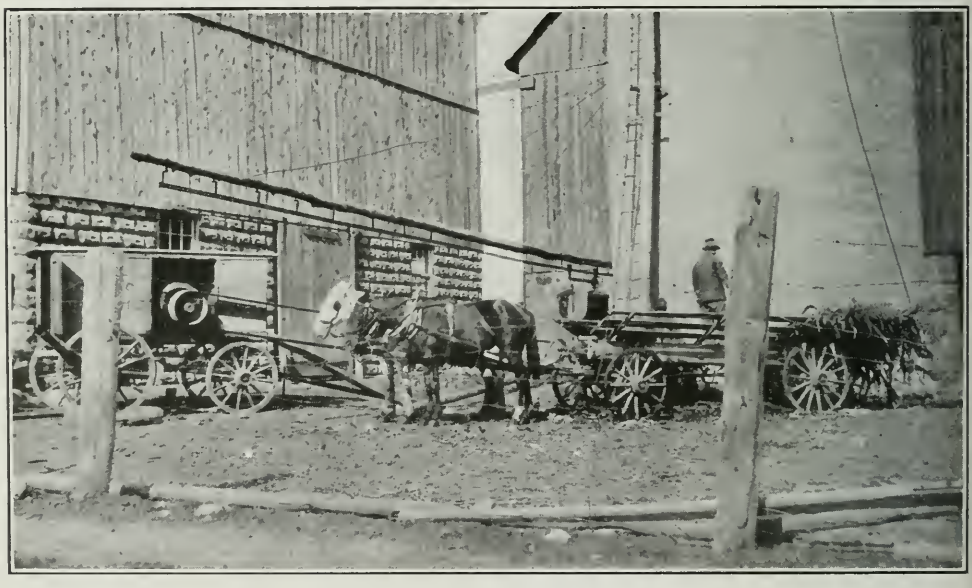
For seed production the cultivated row system requires less seed, conserves soil moisture, tends to keep the land free of weeds, insect pests, etc., and favors a larger seed production.

This experiment should give some good information regarding the possibilities of growing good seed of the Grimm alfalfa variety, and will undoubtedly be the means of inducing a large number of farmers to grow alfalfa for seed.

## ELECTRICITY ON THE FARM

In several counties throughout the Province the District Representative has found his attention called to the question of Electricity on the Farm. Under the direction of the Hydro-Electric Commission the development of Hydro-Electric Power has become an important factor in Ontario. So much so that the cost is gradually being reduced to a minimum and the farmer in many districts is enabled to apply it to many uses on the farm. In order to interest the farmers in this important development the District Representatives have been co-operating with the Commission in holding meetings and have met with very encouraging results. In the County of Oxford Hydro-Electric Power on the farm has reached its greatest development.

As an example of how it is being used the following description of the equipment installed in the farm of Mr. John D. Karn, near Woodstock, may prove of interest.



Silo filling by electricity.

*A Milking Machine and a Cream Separator,*
Both of which are belted to a line shafting, which is belted to a 2 h.p. motor, installed on a bracket in the corner of the dairy room.

*A 10" Chopper,*
Which is permanently loaded on the floor of the barn and is driven intermittently by a 5 h.p. motor, which is brought for the purpose from the pumping house to the barn, being connected to a station which was installed for the purpose.

*A Pump and Jack,*
Driven by 5 h.p. motor which is located in an annex to the summer kitchen. This pump is not automatic, but as it pumps to a tank, it would be very simple matter to make it so.

*A Washing Machine and Electric Iron,*

A vacuum cleaner is owned by his neighbour, Mr. Innes, and I understand that they arrange for the use of it at intervals according to their needs.

With regard to lighting, Mr. Karn has made quite a complete installation on his place, which consists of a full equipment for the whole of the house, most of the rooms having a switch just inside the door for the control of the fixture of that room, 3-point switches being used at the stairway so that the light may be turned on at the top of the stairs and turned off at the foot, or *vice versa*. Each of the different outbuildings, that is, the drive shed, wood shed, and implement shed, have lights, as well as a complete installation on each of the two barns. An outside light is installed in the corner of the one barn so as to light the barnyard, there is another just outside the house opposite the back door, which is used most, and another at the gateway, the entrance to the driveway.

Mr. Karn is a member of the Syndicate of West Oxford, owning a share in the 25 horse-power motor outfit and the machines that go with it—that is, a "McCloskey" grain separator, a "Wilkinson" box and a 30 in. buzz saw. The syndicate outfit, of course, is moved from place to place according to their needs.

## WIDE SCOPE OF WORK

I have endeavored to point out a few of the main features of the District Representative work in Ontario. I regret that space will not admit of further detail, except to say that the District Representative is becoming more and more an important factor in the agricultural life of the Province. Farmers' Clubs are gradually increasing in number through the influence of the District Representatives: Pure-bred Breeders' Clubs, which have as their object the creation of a community interest in certain breeds of live stock and the conducting of pure-bred live stock sales, are becoming more in evidence each year: Pure Seed Centres, where farmers are banded together for the purpose of improving the quality of seed produced in their district, are gradually increasing in number and usefulness: Vegetable Growers' Associations, Fruit Growers' Associations, Beekeepers' Associations, in fact all the various organizations which have for their object the betterment of agriculture, are receiving encouragement and assistance through the establishment of the District Representative offices.

They are on their way to the School Fair and both are happy.

## EXTRA ASSISTANCE TO VEGETABLE INDUSTRY

With headquarters at Toronto, but working to some extent through the District Representatives, a Vegetable Specialist has been attached to the staff of the Department to render expert assistance to the men engaged in this industry, the

importance of which is increasing from year to year. Splendid work has been done in disseminating information by way of the preparation and publication of Bulletins, the holding of field demonstrations and the giving of illustrated lectures. These have dealt with both the outdoor and indoor vegetable growing. In regard to the growing of vegetables under glass, it has been pointed out that large quantities of these are imported into this Province every year and consequently a market exists which would justify the encouragement of intensive cultivation of this nature.

Of great value to the industry have been the experiments carried on in the control of disease. The most notable illustration of this from the work of last year was the work done in regard to Celery Blight. This disease causes a loss of many thousands of dollars through Ontario annually, it being estimated that the annual loss in the vicinity of Toronto alone has been over $10,000 during the past few years. Hence work was undertaken by the Vegetable Specialist with a view to controlling the Blight, and between nine and ten acres of celery, comprising about 350,000 plants, were taken under supervision in the vicinity of Toronto and London. As a result of the work carried on it was found that 95 per cent. of the celery which had been properly sprayed was first-class celery, while in all the cases the check plots which were left unsprayed were of practically no use after the middle of July and were a complete loss. The results thus secured were regarded as of the highest importance to the vegetable growers, and it may be of interest to know the methods adopted and the treatment.

These plants were sprayed with Bordeaux mixture, strength 4-4-40, every week or ten days from the time the plants were through the ground one-half inch until a week before harvesting time. The last spraying before harvest was of Ammoniacal Copper Carbonate, used to make no cause for complaint on account of discolored leaves through the action of lime. In the seed bed a knapsack sprayer was used which held five gallons of solution. In the field on several places ordinary barrel sprayers, which sprayed four rows at once, were used, and on others compressed air machines driven from the wheel. Four nozzle sprayers were used in the field until the plants were 8 inches to 10 inches high. Then a 12 nozzle sprayer was employed, which still sprayed four rows, but besides spraying the tops of the rows and sides of the heads of celery were also sprayed.

COST.

| | |
|---|---|
| 70 lbs. lime at 40c. per bushel | $0 40 |
| 70 lbs. bluestone at 7c. per lb | 4 90 |
| 3 pints ammonia at 25c. per pint | 0 75 |
| 5 oz. copper carbonate at 25c. per lb | 0 08 |
| Manual labor, 52 hours at 20c. per hour | 10 40 |
| Horse labor, 40 hours at 15c. per hour | 6 00 |
| Total cost for season for 1½ acres | $22 53 |
| Total cost for season for 1 acre | 15 00 |

The Vegetable Specialist emphasizes the following points as requiring careful attention: (1) It is necessary to spray thoroughly every week or at least every ten days throughout the season; (2) In hot muggy weather the disease spreads rapidly, and for this reason it is advisable to spray every other day during such a time; (3) Spray mixture must be applied with sufficient force to give a fine mist; (4) It is advisable that the rows should be sprayed both ways each time: (5) Regular sprayings properly applied only give satisfactory results.

Similar experiments have been carried on in regard to the control of other vegetable diseases.

## CO-OPERATION AND MARKETS BRANCH

With the beginning of the calendar year a new Branch of the Department was created to be known as the Co-operation and Markets Branch and to deal in an educational way with such matters as the name would embrace.

For some years past, more especially in recent years, there has been a movement along co-operative lines in various sections of the Province, and consequently an ever-increasing demand for information. In order to give both information and encouragement in a larger measure than in the past this branch has been established and has already rendered useful service.

Naturally the first step was to find out the present status of co-operation in the Province, to put existing organizations on a firm basis as well as help in the formation of new associations.

Farmers' Clubs received attention. Of these there are considerably over 200 in the Province, and many are buying supplies such as seeds, feeding stuffs, etc., for their members. Very few of the clubs are selling farm products. Nine clubs, however, reported sales amounting to a total of $28,000, while thirty-six clubs reported purchases to the amount of $75,700 during the season. These figures, of course, do not represent the amount of trading being done by all clubs, as many were unable to give reports of the amount of their business, and from the majority no reports were received.

Instances could be given of individual clubs doing a large amount of business in both buying and selling. Most of the clubs, however, are not organized on a basis to allow for growth, and though the organization is adequate for the present, future development means a reorganization. It would appear that the first essential in farmers' co-operative work is sound organization, and a good deal of the work of this branch during the year has been in assistance toward such organization.

In order to facilitate direct trading between clubs a circular letter was sent out asking for a list of products for sale and wanted. The return lists were made up and distributed to all clubs and other organizations. From the distribution of these lists much trading back and forth has been carried on, but as the correspondence resulting takes place directly between these organizations there is no direct means of knowing how much use has been made of the plan. From numerous expressions of opinion received, however, the plan seems to have been of material help in putting the clubs in touch with one another, and there is a strong desire that it be continued.

### EGG CIRCLES

Egg Circles in the Province number 63, distributed as follows:—

Brant Co., 5; Bruce Co., 1; Dundas, 17; Durham, 3; Grey, 1; Hastings, 3; Lanark, 4; Leeds and Grenville, 8; Lennox and Addington, 2; Middlesex, 2; Norfolk, 1; Northumberland, 3; Ontario, 9; Prince Edward, 1; Victoria, 3—Total, 63.

Progress in Egg Circle work has been fairly rapid for the past few years, but a number of circles have been meeting with difficulties, and care will be necessary in the future.

Fifteen of the circles in Dundas County have a central organization known as the Dundas Co-operative Egg and Poultry Association. The Central Association engages a manager who markets the eggs of a number of the circles, but the

local managers may sell independently. With the aid of the Dominion Government this association has lately been candling the eggs before shipment, with good results. Last year some $36,000 worth of eggs were sold, and the association is desirous of having a more efficient organization for handling the eggs of the district and possibly other products as well, and we are endeavoring to assist them in this organization.

An organization dealing largely in eggs and poultry is the Lansdowne Farmers' Club. Besides marketing eggs to retailers and private customers, the club also undertakes the fattening and sale of poultry for its members, and has established a fattening station for this purpose. The manager of the circle visits Montreal as occasion demands to locate suitable markets for their produce.

As an instance of the financial returns of an Egg Circle, Cambray Circle, in Victoria County, might be cited. In three months this circle of fourteen members sold $947.79 worth of eggs and poultry. The local price of these goods amounted to $771.00, leaving a gain of nearly 23 per cent. It should be borne in mind that the presence of a circle in a community has an effect on the local price, so that the gain in this instance is in reality greater.

The main object of an Egg Circle is to produce quality and eliminate wastes occurring from the marketing of an improper quality of eggs and poultry. As at present operated many of the circles are accomplishing these objects, but in other cases improvements seem necessary.

### FRUIT GROWERS' ASSOCIATIONS

Fruit growers' organizations in the Province number 53. Some thirteen of these market mixed fruits and forty market apples only.

Fruit Growers' Associations are among the oldest co-operative organizations in the Province, and many of them have been doing a successful business for a large number of years. A number, however, started in recent years in a small way are feeling the need for a better basis of organization, and assistance has been given in a number of such cases. For instance, the Durham Fruit Growers' Association desired to erect a fruit-house, but were organized without the necessary capital for such a purpose. Instead of having a small company of members erect the house and renting it to the Association, as has been done in most sections, the Association obtained capital from each member and now holds and owns the fruit-house as an association. Other associations are also re-organizing with capital to carry on their work on a better basis.

### VEGETABLE AND POTATO GROWERS' ASSOCIATIONS

Associations in the Province marketing vegetables include Rainy River Potato Growers' Association, Sarnia Vegetable Growers' Association, Independent Vegetable Growers of Sarnia, Durham Potato Growers' Association, Hastings Potato Growers' Association, and the Hillsburg Potato Growers' Association.

Some of these market seed potatoes only, but other are marketing all vegetables. In case of the Rainy River Potato Growers' Association potatoes is one of the minor products marketed. Hay, grain, cattle, hogs, poultry and eggs are also marketed. The start, however, was made by the purchase of a car load of seed potatoes of one variety. As a result, the association the last two or three years has been shipping this one variety in car-load lots with the resulting advantages. Moreover, practically all the potatoes grown in the district, both by members and non-members, are of this variety. The Rainy River Potato Growers'

Association is divided into six branches, and is doing a business of approximately $30,000 a year. The local markets of this district are small and consequently the Association is filling an essential need in finding distant markets.

Two other outstanding associations are those with headquarters at Sarnia, each of these associations doing a business of approximately $40,000 to $50,000 and increasing each year. All kinds of vegetables are shipped in car-load lots, and as a result of the operations of these associations the growing of vegetables has been greatly stimulated in the district.

## SEED

There are but few seed selling co-operative associations doing business in the Province. Perhaps the largest of these is the Erie Farmers' Co-operative Association, selling mainly grass and clover seeds to the amount of over $100,000 annually. The River Front Corn Club and other seed centres in Essex and Kent Counties selling seed corn, and the Grand River Alfalfa Seed Centre in Haldimand County, for selling home-grown alfalfa seed, are also important selling associations.

Spraying for late blight on potatoes.

A new impetus is being given to seed selling associations by the organization of seed centres in connection with the Canadian Seed Growers' Association. Over forty such centres have been established in Ontario and many of them no doubt, in the near future, will have seed for sale.

## LIVE STOCK

A number of Farmers' Clubs have been making shipments of live stock to central markets on a simple basis. For instance, the Minto Farmers' Club has a Live Stock Committee which notifies its members of the day of shipment and asks for contributions of stock towards the shipment. The members are paid for stock when delivered to the association on the basis of quotations of the previous day, less a reasonable margin, and the adjustments are made late. The manager takes the

stock through to market, where each member's stock is sold separately. A number of other clubs are carrying on similar work.

The Belleville Holstein Breeders' Association (a business of $21,000 in 1914) and the Menie District Ayrshire Breeders conduct annual sales of pure-bred stock, resulting in these districts being widely known, attracting buyers, and stimulating the live stock interests of the country.

### WOOL GROWERS

During the year a number of wool growers in Manitoulin were organized as an association for marketing their products. The wool was gathered at four shipping points on the island, where each member's wool was graded and weighted. The total product was sold at one sale on this graded basis, with the following result:—

| | |
|---|---|
| 216 | lbs. Medium combing at 23½c. |
| 3,810½ | lbs. Low medium combing at 22½. |
| 5,242 | lbs. Lustre combing at 21c. |
| 5,378½ | lbs. Coarse combing at 19c. |
| 737½ | lbs. Rejects at 16c. |

Flat prices paid by the dealers previously were from 14c. to 17c. a pound. The Association looks forward to marketing lambs and other farm products.

### PARCEL POST

As far as can be gathered at present little use has been made of parcel post by farmers in the marketing of produce. Trial shipments of eggs were made from Oakville to Toronto. During December boxes containing fifteen eggs sold to the consumer for 85c. The boxes were valued at $7 per one hundred, but in this case the boxes were returned by the customer. The postage was 7c. per box. The average price for box and postage was 8c., netting the grower 77c. per 15 eggs, or about 62c. per dozen. Later shipments were made, and, though the returns were not as great, results were equally satisfactory for both producer and consumer, as later orders called for all the eggs on this farm at prices netting the grower slightly above the market price of new laid eggs in Toronto. The possibilities need further investigation.

### MISCELLANEOUS

During the year a Honey Producers' Association was formed in Elgin County for the purpose of grading and marketing the honey crop of the members. A number of tobacco growers around Blenheim have also formed a Tobacco Marketing Association. Little effective work has yet been done by these associations, but prospects are bright.

Co-operative Creameries and Cheese Factories, Rural Telephone, Rural Credit, and a Book-keeping System for Associations, are lines of co-operative endeavor in which a start in investigation has been made. Considerable work remains to be done, however, before definite statements can be made.

Municipal Markets, their value, operation and use, are also receiving attention. Nearly every town in Ontario is supplied with a farmers' open market, and their value in bringing producer and consumer together is undoubted. It would appear, however, that they might be made a more effective factor than they are at present.

## MONTEITH DEMONSTRATION FARM

The past season was a fairly satisfactory one for this farm. Although the north country generally suffered from lack of rain and the prevalence of forest fires, the immediate vicinity of Monteith appeared to be more fortunate in both.

There were 40 acres under cultivation at the farm, and the following results were secured:—

| | | |
|---|---|---|
| 200 | bushels of | O.A.C. No. 72 seed oats. |
| 150 | " | other varieties of oats. |
| 65 | " | Dawson's Golden Chaff seed wheat. |
| 50 | " | Spring wheat (estimated). |
| 200 | " | O.A.C. No. 21 Barley. |
| 27 | " | seed Peas. |
| 150 | " | Potatoes (6 varieties, mostly Early Eureka). |
| 300 | " | Turnips. |
| 28 | tons of | Red clover hay (estimated). |
| 2 | " | Timothy hay (estimated). |
| 2 | " | Alfalfa hay (estimated). |

A year ago twenty-five acres, which had previously been logged and burned, were seeded to a mixture of red clover and alsike, with rather disappointing results at first. This year the same fields, with no further seeding of any kind, yielded an abundant supply of good clover pasture for all the stock on the farm. They pastured on it throughout the whole summer. Apparently one must wait at least two years for best results when seeding new land.

A small piece of land which was seeded to alfalfa in the summer of 1912 has yielded two good crops each year. With the exception of a small spot on the top of the hill where the snow blew off in the winter, this plant seems to thrive very well. All kinds of clover grown on the farm have yielded most abundantly, and in spite of the dry weather the second crop of clover came along fine.

Last year one-half a field of peas were ploughed down, and this year the whole field seeded to O.A.C. No. 72 oats. Where the peas had been the oats yielded 60 bushels per acre. On the other half of the field, with nothing ploughed down, they yielded less than 25 bushels per acre. It would seem the crop had been more than doubled by ploughing down the peas, but probably ploughing down clover would have had equally as good if not better results.

On the 7th of August, the Second Annual Demonstration Day, or Farmers' Picnic, was held, when over 1,000 people took advantage of the T. & N. O. excursion to visit the farm. The day was fine but bush fires were evident everywhere throughout the whole district, and it is a well-known fact that this kept very many settlers at home guarding their crops. As it was the fire did much more good than harm, and as a result there will be many hundreds of acres more under cultivation in 1915. The excursion train arrived at the farm about one o'clock and soon hundreds of settlers could be seen spread over the various parts of the farm inspecting the crops. At the barn they inspected the stock, including pure-bred horses, hogs, sheep, and cattle. Near the barn was the gasoline traction ditching machine in operation, with men behind it laying tile. In the shed cement tile were being manufactured and the settler had an opportunity of seeing the machines in actual operation. A large tent was erected near the buildings. It had a seating capacity of over 200, and in here, as well as in front of the verandah, the farmer had an opportunity of hearing good practical lectures on subjects appropriate to the district.

There has been a very rapidly increasing demand from the settlers for good seed of all kinds. This year 65 bushels of seed wheat were sold, and three times the quantity could have been sold had it been available. There are already more applications for seed than can be filled next spring. These include many applications for spring wheat, oats, barley, peas, and clover seed. This is a very important phase of the work of this farm. Bad seeds are being scattered throughout this whole North Country at a remarkable rate and settlers cannot be too careful.

The farm is also serving a most useful purpose in improving the stock of the neighborhood. All the cows in the district were bred to the imported milking Shorthorn bull and the mares to the fine Canadian Clyde kept for the Matheson Live Stock Improvement Association. Fifteen pure-bred pigs have been sold to settlers at nominal prices with a guarantee that they are to be kept for breeding purposes.

During the summer a gasoline traction ditcher, a cement mixer, and a tile machine were purchased, and 16 acres of land thoroughly drained. On December 18th, with the snow nearly two feet deep on the ground, water flowed from one of the main tile outlets at the rate of a pail every two seconds. This totaled over 2,000 barrels per day from each outlet. Further experiments in drainage will be carried on.

## COLONIZATION AND IMMIGRATION

The following table shows the record of the work of this branch, as far as it can be shown by statistics:—

| | |
|---|---|
| Number of farm laborers placed on farms by Bureau of Colonization | 1,835 |
| Number of farm laborers placed on farms by Salvation Army | 271 |
| Number of other immigrants brought to Ontario by Salvation Army | 1,289 |
| Number of domestics placed by Salvation Army | 42 |
| Number of domestics given twenty-four hours' accommodation at the Women's Welcome Hostel and placed by them | 736 |
| Number of domestics placed by other agents | 845 |
| | 5,018 |

This, of course, is a very considerable decrease over previous years, the reasons for which are obvious. Previous to the outbreak of war there was a slackening of immigration, and when war was declared it ceased absolutely.

Family of immigrants brought to Ontario.

Although less in number, it is safe to say those brought out during the year were of a higher standard than ever before. As is well understood, this branch interests itself only in those who desire to go on the land as farm help or as owners and domestic servants. In reference to the latter the scarcity was so great a few years ago that it was decided to offer a bonus of $5 for each domestic placed in this Province. This augmented the supply to such an extent that it was decided to discontinue the bonus after September 1st. Due notice was given and the bonus has now been cancelled.

In regard to farm help, it is pleasing to state that 75 per cent. of those placed through this Bureau have been placed on yearly engagements. When there was a great deal of unemployment in the city a letter was addressed to the Civic Employment Bureau asking to be advised of any men out of work who claimed to have been brought out by the Ontario Government to report to the Colonization Branch, where they would be provided with work. None applied and no advice was received of any having been brought out by this Branch being among the unemployed. During the fall a circular letter was addressed to 40,000 farmers urging them to employ all the help they could reasonably utilize during the winter months. In this way we were able to find positions on farms for all who applied to us for such work. The chief reason more are not so placed is because they have neither the inclination nor the training for such work.

### NEW ONTARIO

This has been a record year in the number of inquiries we have received concerning New Ontario, coming from all parts of the world, but chiefly from the Western States and the Canadian Northwest.

We issued this year over the different railways 2,859 Ontario Settlers' Certificates, which entitled people to colonization rates who intended to become *bona fide* residents. As one certificate is sufficient to represent a family, the average is about two people to every certificate issued, and means that this year 5,718 took advantage of this special colonization rate.

Co-operating with the Temiskaming & Northern Ontario Railway Commission, a Demonstration Car fitted with products of the soil from all parts of New Ontario was again sent on a three months' itinerary of the principal towns and cities in Old Ontario. Thousands of people took advantage of seeing for themselves what the great northern country was capable of producing, and were given information and were handed out booklets which showed them at a glance the tremendous opportunities afforded the ambitious young man to obtain 160 acres of land for himself at the small cost of 50c. per acre.

# FACTORY INSPECTION BRANCH

The year have been a busy one in the enforcement of the Factory, Shop and Office Building Act. There were in all some 10,059 inspections made, an increase of about 3,000 over last year. This increase is no doubt very largely attributable to the fact that shops and office buildings were added to the classes coming under the jurisdiction of the inspectors. Of the 10,059 inspections, 7,625 were first inspections and 2,434 were second inspections or revisits. With a slackening in the industrial activity of the Province the difficulties in enforcing the Act have been lessened.

The territory covered includes 410 cities, towns and villages, and in the factories and mercantile establishments there were 229,480 employees. Only in 94 cases were employees found to be under 14 years of age, and in these of course the law was promptly enforced.

A significant feature in industrial activity in recent years has been the rapid growth in the use of electric energy which is now rapidly overtaking steam power. The figures given are as follows: Steam horse power. 386,767; electric. 273,357; water. 59,896; gas or gasolene, 7,042.

Recommendations made number 6,808 and dealt with the following subjects: Sanitation, boiler inspection, child labor, fire escapes and other fire protection. guards for machinery and safety of electrical devices. exhaust systems. hours of labor, mode of wearing the hair, and such other orders or suggestions as were deemed necessary or advisable. Advice has been received that many of these orders have been complied with, or employers signify their willingness and intention to comply at the earliest possible moment. circumstances sometimes rendering immediate attention impossible.

Complaints received were of the usual variety. It is noticeable, however, that only two or three related to dangerous conditions. the majority being unsanitary condition or lack of closet accommodation; others were heat. ventilation, overtime. employment of children. Chinese laundries, etc., few of which on investigation were sustained; those that were upheld were remedied forthwith.

Fifteen prosecutions were instituted during the year. and in nearly all cases conviction was recorded and fines imposed.

For neglecting to use a guard which had been provided for a machine an employee of the Knechtel Furniture Co.. Southampton. was fined $8. Previous warnings had been disregarded.

Albert Mundell, a baker. was charged with obstruction (sec. 18. sub. 3) and fined $30 and costs. A complaint had been received that men were working on Sunday. and when the inspector attempted to investigate the matter admittance was refused and the door locked.

The Canada Foundry Co.. Davenport. was prosecuted under Sec. 43 and subsections. and fined $250.

Keenan Bros.. of Owen Sound. was fined $10 for employing children under 14 years of age in contravention of Section 55 of the Act.

Several Chinamen in Sarnia for violation of the regulation regarding rooms separate from laundry for eating and sleeping (Sec. 19). Fines amounted to $17. One. Jim Lee, produced a document showing that the business had been purchased

by another, Lee Fon, in view of which the magistrate fined Jim Lee, "manager for Lee Fon," $2 and costs.

Five Chinamen in Toronto, convicted of failure to observe Sec. 49, were fined each $1 and costs. Previous warning disregarded also in this case.

No explosions of boilers coming under the Act were reported this year.

Owing to exigencies of trade 122 regular overtime and 19 special bake shop permits were issued, a decrease of 24 regular and 28 special permits. A good many were required to meet the demands of the Federal Government for military supplies.

## STATIONARY ENGINEERS' BRANCH

In this Branch is directed the work of issuing certificates to all stationary engineers operating stationary steam plants of 50 h.p. or over and carrying over 20 pounds pressure throughout the Province of Ontario. Considerable work is entailed in examining the engineers and renewing their certificates each year.

Complaints regarding the violations of the Stationary Engineers' Act have been fewer than ever before.

During the year the Board examined 1,076 candidates, and about 8,400 Stationary Engineers' Certificates were issued.

On July 1st, 1914, an Amendment to the Stationary Engineers' Act passed at the last session of the Legislature came into force. This amendment compels all engineers operating hoisting plants working at a pressure of 20 pounds or over, irrespective of horse-power, and used for hoisting in structural operations or excavating purposes, to hold a hoisting engineer's certificate from this Board. Provision was made for accepting without examination applicants who qualified for certificates under the following conditions:—

Form (A)—Anyone who, on the date the amendment came into force, was in charge of a hoisting steam plant, irrespective of horse-power, in the Province of Ontario.

Form (B)—Anyone who, on the date the Amendment came into force, held a certificate as stationary engineer granted to him by the Board of Stationary Engineers of Ontario.

Any hoisting engineer who could not qualify on either of these forms was required to pass the examination set by the Board.

Since the passing of this Amendment there have been 275 applications for Hoisting Engineers' Certificates.

Manitoba and Quebec have, since the Amendment came into force in Ontario, passed a similar Act. These Provinces were forwarded, upon request, copies of the Ontario Act and Regulations, and copies of their Acts indicate that they have adopted the Ontario Regulations pretty fully.

From the reports received, and taking into consideration the short time this Amendment has been upon the Statute Books, it is safe to say the Act is giving good satisfaction.

All of which is respectfully submitted.

JAS. S. DUFF,

*Minister of Agriculture.*

FORTIETH ANNUAL REPORT

OF THE

# Ontario Agricultural College

AND

# Experimental Farm

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

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*To His Honour* JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

*Lieutenant Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Fortieth Annual Report of the Ontario Agricultural College.

JAMES S. DUFF,

*Minister of Agriculture.*

DEPARTMENT OF AGRICULTURE,
TORONTO, 1915.

# THE ONTARIO AGRICULTURAL COLLEGE, GUELPH

Hon. James S. Duff, Minister of Agriculture, Toronto.

## FACULTY OF INSTRUCTION, 1914-1915.

(All, except the President, arranged in order of Seniority.)

G. C. Creelman, B.S.A., LL.D. ..... President
H. H. Dean, B.S.A. ..... Professor of Dairy Husbandry
C. A. Zavitz, B.S.A. ..... Professor of Field Husbandry
J. Hugo Reed, V.S. ..... Professor of Veterinary Science
G. E. Day, B.S.A. ..... Professor of Animal Husbandry
J. B. Reynolds, B.A. ..... Professor of English
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Miss Mary Urie Watson ..... Director of Home Economics
John Evans ..... Professor of Manual Training
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Morley Pettit ..... Lecturer in Apiculture
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E. W. Kendall ..... Lecturer in Manual Training
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A. W. Baker, B.S.A. ..... Lecturer in Entomolgy
T. H. Lund, B.S.A. ..... Lecturer in Bacteriology
Miss M. A. Purdy ..... Demonstrator in Chemistry
Miss Jean Roddick ..... Instructor in Domestic Science
Miss Alta Dickey ..... Instructor in Domestic Art
Mrs. F. Doughty ..... Demonstrator in Domestic Art
Miss Mary McLennan ..... Demonstrator in Domestic Science
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A. L. Gibson, B.S.A. ..... Demonstrator in Chemistry
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S. R. Curzon, B.S.A. ..... Fellow in Chemistry
N. Curtis ..... Instructor in English and Resident Master
D. W. Gillies ..... Instructor in Athletics

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W. O. Stewart, M.D. ..... Physician
Mrs. K. T. Fuller ..... Superintendent, Macdonald Hall
Mrs. Cunningham ..... Matron, Agricultural College
Miss M. Rutherford ..... Dietitian

Main Building, O. A. C., Guelph.

The Library and Biology and Physics Building.
(Ontario Agricultural College.)

# ONTARIO AGRICULTURAL COLLEGE

## AND EXPERIMENTAL FARM

## 1914

*To the Honourable the Minister of Agriculture*:

SIR,—I have the honour to submit herewith the fortieth annual report of the Ontario Agricultural College and Experimental Farm, including the report of the Macdonald Institute, for the year 1914.

For some years, it has been felt that the College Report was not fulfilling its true function. Much valuable information, as a result of observation and experiment, was being buried in a general report, and the people failed to dig very much out of it.

With the consent of the Department of Agriculture, we have decided this year to make a change, so that we are presenting to our readers now a general report of the work of the past year, while the special work of the several Departments will be issued in Bulletin form from time to time. I trust these arrangements will meet with the approval of our farmers.

### A TRIP ABROAD.

In the early spring, the President of the College received an invitation from the Government of New Zealand to visit that country and advise with them regarding Agricultural Education. Approval being secured from the Department, I sailed from Vancouver on the 6th of August.

The Hawaiian Islands were visited on the way out, and included an inspection of tropical fruit orchards and extensive sugar cane plants. I found power ploughs making furrows three feet deep with harrows and rollers proportionately strong.

In New Zealand, through the early spring weather of September we found the live stock grazing outdoors, where it had been all winter. In fact, we found no barns or out-buildings of any sort excepting open sheds to be used only during milking time. The New Zealanders have the advantage over us in that their heaviest milk yield comes during our mid-winter, and as our market is the same, namely Great Britain, they have practically no competition at that time.

Everywhere we found the creameries beautifully clean and sanitary. They build such buildings much larger than we do, leaving plenty of room for all operations. They were also well manned, and turn out a splendid product.

The frozen meat trade has stimulated the sheep business in New Zealand, until now it has become one of the most important industries on the Island.

They have a delightful climate, green grass all the year round—no extremes of wet or dry—with good soil. The principal drawback is their distance from everywhere, Australia, their nearest neighbor, being 1,200 miles away.

I addressed meetings at different points, and visited on their own farms several members of the Board of Agriculture.

Australia, which has a population of less than five million, and an area as large as Canada or the United States, was visited next. One of the worst drouths in the history of the continent was operating when we arrived. Fortunately Canada knows nothing of drouth, and I hope I shall never be guilty again of complaining in Canada of dry weather in August, after seeing splendid farming sections in Australia where there had been practically no rain for fifteen months.

Irrigation in Australia is proceeding rapidly, but the waters in all their rivers, if it were all used, would irrigiate only a small portion of this big continent.

Alfalfa growing is being encouraged, and is meeting with success. Fruit growing is becoming an important industry, especially in Tasmania, which is the coldest part of the continent. Farther north, more tender fruits are grown, until in Queensland great quantities of tropical fruits are produced. The sheep industry, I presume, will always be their big business in Australia. The sheep farms are very large, some of them extending over one million acres, while from thirty thousand to one hundred thousand acres is considered only a good sized station. I found graduates of the Ontario Agricultural College doing good work in both New Zealand and Australia.

We returned home by way of the Philippine Islands, China and Japan. By the American Department of Agriculture in Manilla I was informed that the Islands were extremely fertile, and being situated in the tropics, with plenty of rainfall, a great variety of crops could be grown. Corn, rice, sugar cane, hemp tobacco and cocoanuts are perhaps receiving the most attention. Quite a number of American settlers are coming in and taking up farms, and the natives are receiving instruction along the best lines.

In China, perhaps intensive cultivation reaches its highest degree of perfection. On the farms the Chinese are a patient, plodding, and tireless people, on the land when the daylight comes and never leaving it so long as they can see. Whole families make a living on less than one acre. Every particle of fertilizer of every kind is carefully collected and placed back in the soil. Agriculture in China is not organized.

In Japan everything is organized. A strong Central Government controls the railways, telegraphs and telephone lines, while the Minister of Agriculture takes a broad and intelligent view of all farming operations. Colleges and Experiment Stations are plentiful, and apparently well manned, and good instruction given. As in China, the intensest kind of cultivation prevails, 2½ acres being the average possession of the ordinary farm family.

In summing it all up, I came to the conclusion, that while the climate in these Eastern countries is mild, the growing season longer, and the necessity for farm buildings reduced to a minimum, yet the people in Australia and New Zealand were not so progressive, or perhaps were more dependent upon Government aid, and more inclined to blame anyone but themselves when things went wrong. All comparisons, I think, generally speaking, are in favor of Ontario, where our blanket of snow and our keen frost prevents the leaching of fertilizers from our soil through a greater portion of our year, and where more vigorous climatic conditions require keener, more robust constitutions for dealing with the situation.

On returning, I find myself compelled to admit that straight roads, good fences, attractive buildings, rolling country, and healthy and prosperous people make this Province the most attractive farming place which it is my pleasure to know.

## Agricultural Representatives.

Perhaps no one feature of the work of the Department of Agriculture has resulted immediately in such wide-spread satisfaction to the farmers as the appointment of Ontario Agricultural College graduates as leaders of Agriculture in the several counties. These men are doing uniformly good work. Their energy seems tireless and their methods are thoroughly and essentially practical. The farmers now wonder how they ever got along without them, their help and advice; and a considerable amount of time of individual members of our staff is now taken up with interviews and correspondence with these District Representatives in country places. These men are all graduates of the College.

The following is a list of the men and their districts:

| County. | Name. | Location. |
|---|---|---|
| Algoma | A. S. Smith | Sault Ste. Marie |
| Brant | R. Schuyler | Paris |
| Bruce | N. C. McKay | Walkerton |
| Carleton | W. D. Jaekson | Carp |
| Dufferin | H. A. Dorrance | Orangeville |
| Dundas | E. P. Bradt | Morrisburg |
| Durham | R. S. Duncan | Port Hope |
| Elgin | C. W. Buchanan | Dutton |
| Essex | J. W. Noble | Essex |
| Frontenac | C. Main | Sydenham |
| Glengarry | D. E. McRae | Alexandria |
| Grey | H. C. Duff | Markdale |
| Haldimand | G. L. Woltz | Cayuga |
| Halton | H. R. Hare | Burlington |
| Hastings | A. D. McIntosh | Stirling |
| Kenora | P. Stewart | Kenora |
| Kent | J. T. Johnston (in charge) | Chatham |
| Lambton | G. G. Bramhill | Petrolia |
| Lanark | P. S. D. Harding | Perth |
| Leeds and Grenville | W. H. Smith | Athens |
| Lennox and Addington | G. B. Curran | Napanee |
| Manitoulin | I. F. Metcalfe | Gore Bay |
| Middlesex | I. B. Whale, Box 663 | London |
| Norfolk | Geo. Wilson | Simcoe |
| Northumberland | R. S. Beckett | Brighton |
| Ontario | R. M. Tipper | Whitby |
| Oxford | G. R. Green | Woodstock |
| Peel | J. A. Carroll | Brampton |
| Peterborough | F. C. McRae | Norwood |
| Prince Edward | A. P. McVannell | Picton |
| Rainy River | H. M. McElroy | Emo |
| Renfrew | M. H. Winter | Renfrew |
| Simcoe | J. Laughland | Collingwood |
| Temiskaming | W. G. Nixon | New Liskeard |
| Thunder Bay | G. W. Collins | Fort William |
| | L. M. Davis | Port Arthur |
| Victoria | A. A. Knight | Lindsay |
| Waterloo | J. S. Knapp | Galt |
| Welland | R. Austin | Welland |
| York | J. C. Steckley | Newmarket |
| Wentworth | R. L. Vining, 7 Market St | Hamilton |

## Agricultural Education.

In this Province, the demand for instruction in Agriculture is steadily increasing in the rural districts. Our entire staff could be out in the country all

the time addressing meetings of Farmers' Institutes, Farmers' Clubs, and the many activities of our Agricultural Representatives with their Short Courses here and there, and their longer courses in the High Schools and Collegiate Institutes. These things have given an impetus to Agricultural Education such as has never been seen before in this country.

Public School Work.—In co-operation with the Department of Education we have been able in recent years to handle some hundreds of Rural School Teachers in Short Courses during the spring and summer months. The result of this is that school gardens and other methods of instruction in Agriculture have become a part of the system in many of our counties.

## Short Courses.

Our announcement for this year was as follows:

### ANNOUNCEMENT

For forty years the Ontario Agricultural College has provided Courses of Study and Practical Field Work for farmers' sons, and thousands of young men have taken advantage of it. At first the Course was two years. This was found to be too short, and in 1888 a third year was added. Still later it was found impossible to do justice to the work in three sessions, and the regular College Course, leading to the degree of B.S.A., now covers a period of four years.

But there are many farmers and farmers' sons who cannot spare the time to take the long College Course, and others who might find the time, but have not the means to do so. For the sake of such men, we have supplemented our regular work by adding Short Courses to meet their special requirements.

Better men are wanted to manage our Cheese Factories and Creameries, to give instruction to our Cheese and Butter-makers, to judge the Live Stock and Farm Produce at our Fall Fairs, to grasp the opportunities in Fruit-growing and Bee-keeping, and the boys and girls of the farm would be benefited by a better knowledge of the Poultry Industry.

The Courses are offered for the purposes above indicated, and any farmer's son or farmer's daughter should find it profitable to take a Short Course at the Ontario Agricultural College.

This year the Department of Agriculture had offered as scholarships in their Acre Profit and Pig Rearing Competition a two weeks' course at the College. Sixty-eight of these young men who won distinction in Canadian Agriculture, joined our short course classes. We hope that many of these men may see their way clear to take longer courses later on.

The attendance in these Short Courses in 1914, was as follows:

| | |
|---|---|
| Dairy Courses | 86 |
| Stock and Seed Judging | 158 |
| Poultry Raising | 40 |
| Fruit Growing | 114 |
| Apiculture | 87 |
| Total | 485 |

### Stock Judging.

The National Live Stock Exhibition of Chicago did not hold its annual fair in December, hence no team went from the College.

The Winter Fair in Guelph was unusually successful under all the circumstances. The following is a list of our students who were prize winners in each class:

| *Horses.* | *Beef Cattle.* | *Dairy Cattle.* |
|---|---|---|
| 1. Skelton, R. J. | 1. Sackville, J. P. | 1. Vahey, P. D. |
| 2. Vahey, P. D. | 2. Bell, W. J. | 2. Frejd, D. |
| 3. Kedey, W. M. | 3. Lane, A. C. | 3. (Outsider.) |
| 4. Steele, J. A. | 4. White, W. R. | 4. Simmons, A. F. |
| 5. Fenwick, F. | 5. Finn, R. A. | 5. Hempson, E. |
| 6. Croskery, W. M. | 6. Gregory, P. S. | 6. Wood, W. E. |
| 7. Clarry, A. G. | 7. Hales, J. P. | 7. Hinman, R. B. |
| 8. Locke, W. A. | 8. McArthur, J. A. | 8. Cotsworth, F. B. |
| 9. (Outsider.) | 9. Neff, E. F. | 9. Watt, R. S. |
| 10. Fuller, J. C. | 10. Cox, C. | 10. Mallory, L. H. |

| *Sheep.* | *Swine.* | *Poultry.* |
|---|---|---|
| 1. Foyston, B. E. | 1. Reilly, E. E. | 1. Vahey, P. D. |
| 2. McEwen, D. E. | 2. McPhail, M. C. | 2. Bennett, W. |
| 3. Frejd, D. | 3. Watt, R. S. | 3. Hogarth, E. G. |
| 4. Colquette, R. D. | 4. Wood, W. E. | 4. McAdam, J. A. |
| 5. Coke, J. | 5. Elder, R. C. | 5. Foyston, B. E. |
| 6. Shaw, W. R. | 6. Newman, R. B. | 6. Ware, B. W. |
| 7. Elder, R. C. | 7. Baird, A. B. | 7. Wilson, G. R. |
| 8. McQueen, M. J. | 8. Cumming, R. E. | 8. Hales, J. P. |
| 9. Hinman, R. B. | 9. Colquette, R. D. | 9. Roger, J. C. |
| 10. Slack, P. B. | 10. Murray, R. | 10. Neff, E. F. |

### College Work and Progress.

The following figures showing the attendance in all departments shows that the College is splendidly maintaining the popularity which its work has won:

| | | |
|---|---|---|
| General Course | 619 | |
| Specialists in General Course Work | 19 | |
| Manual Training (One Year Normal Course) | 7 | |
| Teachers' Courses (Agriculture and Horticulture) | 39 | |
| Dairy Course | 86 | |
| Stock and Seed Judging | 158 | |
| Poultry Raising | 40 | |
| Fruit Growing | 114 | |
| Apiculture | 87 | |
| | | 1,169 |

### At Macdonald Institute.

| | | | |
|---|---|---|---|
| Domestic Science | | 274 | |
| Summer Courses—High School teachers | 13 | | |
| Public School teachers, first year | 63 | | |
| Public School teachers, second year | 32 | | |
| | | 108 | |
| | | | 382 |
| Total | | | 1,551 |

N.B.—There were also 140 children from the Guelph Public Schools who received instruction in Domestic Science at Macdonald Institute.

### Analysis of College Roll (General Course), 1914.

*From Ontario.*

| | | | | | |
|---|---|---|---|---|---|
| Algoma | 6 | Huron | 9 | Peel | 10 |
| Brant | 28 | Kent | 9 | Perth | 9 |
| Bruce | 8 | Lambton | 16 | Peterboro | 6 |
| Carleton | 15 | Lanark | 4 | Prescott | 2 |
| Dufferin | 8 | Leeds | 5 | Rainy River | 1 |
| Dundas | 6 | Lennox | 5 | Renfrew | 3 |
| Durham | 10 | Lincoln | 17 | Russell | 2 |
| Elgin | 13 | Middlesex | 19 | Simcoe | 13 |
| Essex | 7 | Muskoka | 5 | Thunder Bay | 1 |
| Frontenac | 4 | New Ontario | 1 | Victoria | 4 |
| Glengarry | 3 | Nipissing | 4 | Waterloo | 14 |
| Grenville | 5 | Norfolk | 18 | Welland | 6 |
| Grey | 7 | Northumberland | 11 | Wellington | 35 |
| Haldimand | 8 | Ontario | 12 | Wentworth | 19 |
| Halton | 9 | Oxford | 15 | York | 47 |
| Hastings | 3 | Parry Sound | 4 | Total from Ontario. | 466 |

*From Other Provinces of the Dominion.*

| | | | | | |
|---|---|---|---|---|---|
| Alberta | 14 | New Brunswick | 2 | Saskatchewan | 6 |
| British Columbia | 28 | Nova Scotia | 14 | | |
| Manitoba | 5 | Prince Edward Island | 1 | Total from other Provinces | 74 |
| | | Quebec | 4 | | |

*From Other Countries.*

| | | | | | |
|---|---|---|---|---|---|
| Argentine Republic | 1 | Japan | 1 | Spain | 1 |
| B. W. I. | 3 | Mexico | 1 | U. S. A. | 23 |
| England | 27 | Newfoundland | 1 | | |
| Germany | 1 | Russia | 1 | Total from other countries | 79 |
| Ireland | 2 | Scotland | 4 | | |
| India | 2 | South Africa | 11 | | |

### Ages and Religious Denominations.

The limits of age in the General Course, 1914, ranged from 17 to 36 years. The average age was 22.

| | | | | | |
|---|---|---|---|---|---|
| Anglican | 183 | Friends | 5 | Presbyterian | 171 |
| Baptist | 21 | Jewish | 1 | Roman Catholic | 19 |
| Christian Scientist | 1 | Latter Day Saints | 2 | Unitarian | 1 |
| Congregational | 12 | Lutheran | 4 | United Brethren | 1 |
| Dutch Reform | 1 | Methodist | 193 | | |
| Evang. Association | 2 | No Religion | 2 | | |

### New Buildings.

This year again witnesses great building developments at the Institution. The building for the Department of Field Husbandry was opened and presented to the Ontario Department of Agriculture by the Hon. Martin Burrell, Dominion Minister of Agriculture. A brass tablet was unveiled at the time and was afterwards permanently located at the right of the main entrance. This tablet reads as follows:

THIS BUILDING

Erected by the

GOVERNMENT OF ONTARIO

UNDER THE

FEDERAL AGRICULTURAL AID ACT

AND DEVOTED TO

FIELD HUSBANDRY

WAS FORMALLY OPENED

By the

HON. MARTIN BURRELL

MINISTER OF AGRICULTURE

for Canada

Jan. 12th, 1914.

New Poultry Building.—In the Poultry Department a most excellent building has been erected from the Federal Grant. This building will be used both for the purpose of administration and instruction. Poultry culture is coming to occupy an important place in the live stock world, and it gives me great personal satisfaction to see this department now well housed and in excellent position to do the highest class of work.

New Dining Hall.—Perhaps the handsomest building on the grounds is the New Dining Room, with a seating capacity of five hundred. This was built by the Ontario Government, out of their own funds, and is beautifully equipped throughout. The Dietitian in charge reports that all the machinery is working smoothly. The students are certainly well pleased with the arrangements. The Hall was opened in September, 1914, and on the night of January 11th, 1915, all students, members of the staff and ex-students sat down to the first public dinner, under the auspices of the Experimental Union.

Another Building.—We have now in process of construction a large building for the Department of Physics. This will relieve the present overcrowded Biological Building and give more room for Botany and Entomology.

## College Work.

Army worm.—The past summer was distinguished by a remarkable outbreak of the Army-worm. On the 14th of July urgent messages were received from the County of Brant, asking for help and advice to check the ravages of the worms. A man was despatched at once from our Entomological Department and he organized a vigorous campaign. During the next few days letters and messages came pouring in from all directions showing that the outbreak was widespread and very serious. Every available man was sent from the College staff, methods of control were organized and information given through the press and by correspondence. The appearance of a small army on the College farm gave an excellent opportunity of studying the work of the worms and observing the effect produced by hosts of parasites and predaceous insects as well as by birds and other creatures.

A full and complete report, county by county, was prepared at the close of the campaign and is being printed in the Report of the Ontario Entomological Society. We give at this time only a few suggestions for the control of a future outbreak.

(1) Use trenches where the worms are to be confined to a certain area.

(2) Use poisoned bran where the worms are already scattered throughout the crop.

(3) Use land rollers and brush drags where conditions are at all practical.

Little Peach and Peach Yellows:—Both of these diseases, through the instrumentality of the men in our Entomological Department are being rapidly brought under control. In 1911, about 60,000 peach trees were marked for these diseases and destroyed; in 1912 the number was about 25,000; in 1913 it was still further reduced to 6,000, and in 1914 only 3,000 had to be destroyed. We believe that the good results may be attributed largely to the improved methods adopted for teaching the inspectors how to identify the diseases, even in the early stages, and the encouragement which was given them to do their work thoroughly.

Weeds.—Under the supervision of the Professor of Botany co-operative experiments and weed eradication have been conducted for three years. The object of the experiments is to have farmers conduct them on their own farms, under ordinary conditions, and to test the different methods of destruction. Six experiments in all have been tried, forty-eight farmers taking part in the work. The Perennial Sow Thistle, Twitch Grass, Bladder Campion and Mustard in Cereal Crops were included in the work. From reports received, the results indicated:

(1) That good cultivation followed by rape sown in drills provides a means of eradicating both Perennial Sow Thistle and Twitch Grass.

(2) That Rape is a much more satisfactory crop to use in the destruction of Twitch Grass than Buckwheat.

(3) That thorough, deep cultivation in fall and spring followed by a well cared for hoed crop, especially corn, will destroy Bladder Campion.

(4) That Mustard may be destroyed in oats, wheat and barley by spraying with a twenty per cent. solution of Iron Sulphate without any serious injury to the standing crop.

Dandelions in Lawns.—Three years' experiments indicate that 90 per cent. of the dandelions in lawns may be destroyed by spraying six times during the season with a twenty per cent. solution of Iron Sulphate. The objection to this method is that the lawn is rendered more or less black and unsightly during the season and any White Dutch Clover in it is destroyed. The grass, however, is not permanently injured in any way.

Orchard Work.—Most interesting experiments are being conducted in our own orchard and through the Province regarding the pollination of apple blossoms, and in pruning Northern Spy trees with the object of bringing them into bearing at an earlier date. In pollenizing little has been done in this country, and it would look as though there was an important field here for investigation. From this year's work it would appear that the Snow and the McIntosh Apple, which are closely related, give very poor results in cross-fertilizing with one another, whereas the Spy and the McIntosh give excellent results in pollenizing both ways. We are looking forward to getting enough data to be able to recommend varieties for planting that will insure good pollination and therefore, a crop of good fruit.

Regarding the early maturing of Northern Spy trees by pruning, work has already been started in eight orchards in Eastern and Western Ontario, and we hope soon to have some reliable data on this subject.

Winter Injury to Fruit Trees.—Our Horticultural authorities think that we have underestimated the damage done to fruit trees by our severe winter weather, and our Professor of Horticulture states that thousands of trees have been and are being lost from this cause every year. In his report of the year's work he states the following facts:

(1) The forms of winter injury which are most common at the present time are root killing and bark splitting on the trunk.

(2) Much injury of both types occurs through cultivating, late or otherwise, forcing growth of trees.

(3) Much root killing occurs through the absence of windbreaks and the absence of snow covering during winter. Root killing is much more common on wind swept knolls and on ground bare of vegetation.

(4) Root killing is much more common in the southern parts of the Province where snowfall is scanty than in the districts where snowfall is more abundant.

(5) The stocks used by our nurserymen are not hardy enough for Ontario conditions. We find numerous cases in apples, pears, plums, and cherries (all of which are budded and grafted), where the trunk is sound down to the point of union, which is usually at or slightly below ground level. It is very common to find the injury entirely confined to the portions lying below the point of budding or grafting.

(6) A great deal of root killing may be avoided by using cover crops and other means of checking fall growth of trees. Late cultivation is especially to be avoided.

(7) Experiments are now under way at the Ontario Agricultural College to determine the extent to which cover crops and certain methods of soil treatment may be made use of in order to prevent deep freezing of orchard soils.

Legume Bacteria.—In so many places in Ontario it seems hard to get a start in certain varieties of clover, especially alfalfa. We have for a number of years been sending out Legume Culture in small bottles so that the farmers might sprinkle it on the seed and introduce these specific germs into their soil.

Our Department of Bacteriology reports this year that 3,467 cultures were sent out, and that the reports that were returned show the inoculation beneficial to the crop in 79.7 per cent. of the cases.

Study of Soils:—A real Soil Survey has never been made in the Province of Ontario, but through our Department of Chemistry a start has been made.

We attempted to find the requirements of Swamp soils, and now we are going a little further to examine and analyze other soils from several counties.

Lime.—The following paragraph appears in the report of the Professor of Chemistry for this year:—

"Our study in soils so far has shown us clearly that there are considerable areas of soils, especially in the older settled parts of the Province, deficient in lime, and I feel sure that in many cases this is the cause of the poor catch of clover. In looking around for a cheap source of lime we find that we can get the fine dust screenings from the stone crusher for practically what it costs to load the material. This material has been a waste product in the past and we have hopes that it will prove a satisfactory source of lime to sour soils. In connection with this work we have arranged for the application of six car loads. In some cases this has been applied in conjunction with fresh burned lime and gypsum. We are expecting some very interesting results from this work. I feel fully convinced that the judicious use of lime on some of our clayey soils and also on some of our sandy soils will make a very marked difference to the productiveness of the soil."

Tile Drainage.—As in former years this work has been continued under the Department of Physics. 250 farms were laid out this year, the number of acres being 13,386. This makes a total of 88,343 acres drained by our men in the past nine years.

Interesting experiments are now being conducted on several good farms in different counties of the Province with drains 2 and 3 feet deep and 2 rods and 4½ rods apart.

Since the College started this drainage campaign, farmers all over the country have become enthusiastic about the work, and carloads of tile may be seen anytime on railroad sidings of small places where drains had never been dug before. Excellent reports come from tile-drained farms this year, although it was the driest season of which we have any record in this Province.

Lightning Rods.—Great interest has been taken in the matter of lightning rods as brought out in the Bulletin issued by this College. Investigation has shown that well rodded buildings practically remove all danger from damage by lightning, and in some places in the United States buildings properly protected by lightning rods pay a very much lower rate of insurance than those not so protected.

At the present time there appears to be a lot of defective rodding done, and by companies who should know better. Perhaps we will have to get legislation on this point regulating the whole lightning rod business.

## Field Crops.

Increased Production Resulting from Superior Varieties.—So much has been done within recent years in studying and in testing varieties and in the introduction of a few of the kinds which have given the best results that it might be interesting to briefly consider the influence of this work on the crop production of the Province. This influence has probably not been exerted to as great an extent in the past as it will be in the future. This is largely owing to the fact that it takes some time for a variety to become extensively grown throughout the country. Some of the best varieties have only recently been introduced, and are as yet only grown by a few of the most progressive farmers.

The greatest influence has probably been exerted in barley. Twenty-five years ago practically all the barley was the Common Six-rowed variety. This was gradually supplanted by the Mandscheuri barley which the College introduced in 1879, and distributed throughout Ontario for experimental work about five years later. From the small lots which were distributed for co-operative experiments the variety was increased until it became the most extensively grown barley in Ontario. In 1903 the O.A.C. No. 21 variety was started *from a single seed.* This barley gave excellent results at the College, and was distributed throughout Ontario for the first time seven years ago. Its increase has been exceedingly rapid, and it is now grown by hundreds of farmers throughout the Province. It is probably safe to say that fully ninety-five per cent. of all the barley grown in Ontario is of the Mandscheuri and the O.A.C. No. 21 varieties. In the results for the past five years at the College the average yield of grain per acre per annum has been 59.1 bushels for the O.A.C. No. 21; 58.8 bushels for the Mandscheuri; and 45.3 for the Common Six-rowed.

In the oat crop the introduction of new varieties has also exerted a considerable influence. Twenty-five years ago the Egyptian and the Black Tartarian varieties were extensively grown throughout the Province. These have been largely supplanted by the Banner and the Siberian. Each of the four varieties here referred to have been grown at the College continuously for twenty-five years. In the average results of the whole twenty-five year period the annual yield per acre for these four varieties has been as follows: Siberian, 87 bushels; American Banner 83.5 bushels: Egyptian, 74.1 bushels, and Black Tartarian, 68.2 bushels. It now looks as if a new variety which we call the O.A.C. No. 72, which was distributed in small lots in 1911 for the first time, is going to supplant largely all the other varieties. In average yield of grain per acre per annum for the past six years the O.A.C. No. 72 has given 91.4 bushels, and the American Banner, 68.4 bushels.

Twenty-five or thirty years ago the winter wheat was represented largely by the Early Red Clawson and the Surprise varieties. At the present time the Dawson's Golden Chaff is the most extensively grown variety in the Province. If we compare the average results of the Dawson's Golden Chaff and the early Red Clawson for a period of nineteen years we find that the former has given an annual yield of 51.1 and the latter of 46.1 bushels per acre.

A number of other instances might also be mentioned. The Common Grey buckwheat has been largely supplanted by the Silver Hull and the Japanese varieties: The Canada Yellow Flint Corn by the Compton's Early Yellow Flint.

the Salzer's North Dakota White Flint, and the White Cap Yellow Dent varieties; the White Elephant and the Beauty of Hebron varieties of potatoes by the Rural New Yorker No. 2 and the Empire State varieties; the Common Long Red variety of mangels by the Yellow Leviathan and other Yellow Intermediate varieties; the White Belgian variety of carrots by the Short White Intermediate varieties, etc. The crop production in Ontario will undoubtedly be improved to a considerable extent by a few superior varieties which are being introduced, but which have not had time to exert much influence on the crop production of Ontario. Amongst the new varieties here referred to we draw particular attention to the O.A.C. No. 72 variety of late oats; the O.A.C. No. 3 variety of early oats; the Marquis Spring wheat; the O.A.C. No. 61 Rye; The Rough Buckwheat; the Potter and Arthur varieties of peas; the Pearce's Improved Tree beans; the Davies Warrior and the Extra Early Eureka varieties of potatoes; the Wisconsin No. 7 White Dent Corn; the Japanese Panicle millet; the O.A.C. No. 81 Soy Beans; and the Ontario Variegated and the Grimm varieties of Alfalfa.

It is interesting to study the progress of agriculture in Ontario as revealed through the average yield per acre of some of our principal farm crops. We remember some fifteen years ago addressing a meeting in Eastern Ontario when Mr. D. M. Macpherson drew particular attention to the fact that the farms of Ontario were not producing as good results at that time as they had produced twelve or fifteen years previously. We are delighted that a great change in this respect has taken place. The Bureau of Industries for Ontario has collected statistics on crop production in each of the past thirty-three years. If we divide the last thirty-two years into periods of sixteen years each we find that for the latter as compared with the former period there has been an actual increase in yield of grain per acre of some of our principal farm crops as follows: barley, 20 per cent.; fall wheat, 10 per cent.; and oats 9 per cent. These averages in increase in yield per acre if applied to the average value of the crops of Ontario for the past ten years would mean an annual increase for the Province about as follows: Oats $3,267,836; Barley $2,174,147 and Fall Wheat $1,414,244; making a total of $6,856,227. This represents simply the annual market value of the increases of the three principal grain crops per acre when we compare the last sixteen years with the sixteen years previous.

There are at present too many varieties of farm crops grown in Ontario. If many of the inferior varieties were dropped entirely and only the few leading kinds used in cultivation there would be a higher average yield per acre, a better quality of product, more uniformity in sample, and material which would command higher prices. We have evidence which causes us to believe that farmers are realizing more than ever before the importance of securing and growing only these varieties which have reached the highest perfection. A study of the varieties entered in connection with the Field Crops Competition of Ontario, and also at the leading exhibitions at Toronto, Ottawa and Guelph during the past two or three years show that the O.A.C. No. 21 barley and the O.A.C. No. 72 oats are used more extensively than any other varieties of these two classes of grain. Both of these grains are exceedingly popular and will probably be successful in driving many of the inferior varieties from the farms of Ontario. We have the earnest hope that the next sixteen years will show even greater annual increases in yield of crops per acre.

## Animal Husbandry Department.

During the year three Ayrshire heifers and a very high-class imported bull were purchased by the College. These animals are a distinct addition to the herd and have been greatly admired by the Ayrshire breeders who have visited the stables.

The Shorthorns of a Dairy strain have turned out well on the whole, the best cow giving over 11,000 pounds of milk during her period of lactation, and four cows have averaged over 8,600 pounds.

In our Dairy Herd, 30 cows completed their periods of lactation during the year, and these included some heifers averaging 9,131 pounds of milk. Fifteen Holstein cows averaged 11,367 pounds of milk.

In the Beef class an interesting experiment was concluded. For fattening steers—a comparison of Alfalfa and Timothy hay was made, the former proving decidedly the best. Alfalfa is also a most valuable feed for dairy cows which proves it is perhaps our most valuable fodder.

## Macdonald Institute.

Again the courses in household science appear to be highly appreciated by the people of this Province. Not only were all of our classes filled during the year, but for want of room we had to refuse 140 applicants.

While the great majority of girls who attend this school return to manage homes for themselves or their relatives, there are a number each year who take public positions of trust. We are constantly receiving inquiries for women as teachers in Domestic Science, Dietitians in Hospitals; Lecturers and Demonstrators at Womens' Institutes; Superintendents of public institutions, and so forth.

Below will be found a list of appointments of this sort made during the past twelve months:—

### TEACHERS.

| | Class of | Appointed to |
|---|---|---|
| Miss J. Babb | 1914 | Alma College, St. Thomas, Ont. |
| " A. Bell | 190 | Public Schools, Vancouver, B.C. |
| " C. Bredin | 1914 | Public Schools, Prince Albert, Sask. |
| " N. Burke | 1911 | Branksome Hall, Toronto, Ont. |
| " M. E. Cooke | 1911 | Public Schools, Vancouver, B.C. |
| " M. C. Cooke | 1911 | Public Schools, London, Ont. |
| " G. Crowe | 1913 | Collegiate Institute, Galt, Ont. |
| " E. Cumming | 1914 | Institute for the Deaf, Belleville. |
| " N. Goldie | 1913 | Overseas Training School, Woking, Eng. |
| " H. Gowsell | 1902 | Manitoba Agr. College, Winnipeg, Man. |
| " A. Grassie | 1914 | Public Schools, Chatham, Ont. |
| " L. Griffin | 1913 | Public Schools, Winnipeg, Man. |
| " M. Hayward | 1914 | Agricultural School, Claresholm, Alta. |
| " M. Hiltz | 1914 | Havergal College, Toronto, Ont. |
| " F. Hotton | 1914 | Agricultural School, Vermilion, Alta. |
| " F. Irwin | 1914 | Public Schools, Winnipeg, Man. |
| " F. McNally | 1914 | Public Schools, Lethbridge, Alta. |
| " L. Lyon | 1913 | Agricultural School, Olds, Alta. |
| " M. McDougall | 1914 | Public Schools, Saskatoon, Sask. |
| " H. McMurtry | 1914 | Public Schools, Moose Jaw, Sask. |

| | Class of | Appointed to |
|---|---|---|
| Miss A. Marcellus | 1914 | High School, Chilliwack, B.C. |
| " B. Miller | 1913 | Public Schools, Stratford, Ont. |
| " F. Oliver | 1913 | Public Schools, Vancouver, B.C. |
| " B. Philp | 1912 | Macdonald College, Que. |
| " J. Powell | 1911 | Technical Classes, Guelph, Ont. |
| " M. Smith | 1914 | High School, Mission, B.C. |
| " F. A. Twiss | 1907 | Department of Education, Sask. |
| " L. White | 1913 | Public Schools, Ottawa, Ont. |

HOUSEKEEPERS AND DIETITIANS.

| | Class of | Appointed to |
|---|---|---|
| Miss A. Boughner | 1912 | Macdonald Hall, O. A. C., Guelph. |
| " C. Doering | 1912 | Children's Hospital, Philadelphia. |
| " E. Grommitt | 1909 | Temahaac Club, Ancaster, Ont. |
| " H. Johnston | 1913 | Mission Home, Vegreville, Alta. |
| " M. Lees | 1914 | Isolation Hospital, Toronto. |
| " M. McKee | 1908 | Manitoba Agr. College, Winnipeg, Man. |
| Mrs. M. McPhadyen | 1913 | Ontario Ladies' College, Whitby, Ont. |
| Miss R. Murdoch | 1907 | Walnut Lane School, Germantown, Pa. |
| " M. Rutherford | 1909 | O. A. C. Dining Hall, Guelph, Ont. |
| " E. Schwalm | 1913 | City Hospital, Hamilton, Ont. |
| " E. Robertson | 1908 | General Hospital, Toronto, Ont. |
| " I. Weseloh | 1914 | General Hospital, Sarnia, Ont. |
| " L. Wright | 1912 | Brandon College, Brandon, Man. |

WOMEN'S INSTITUTE WORK.

| | Class of | Appointed to |
|---|---|---|
| Miss E. Chapman | 1912 | Mr. Putnam's office, Department of Agriculture, Toronto, Ont. |
| Mrs. E. Dunbrack | 1906 | Dept. of Agriculture, Charlottetown, P.E.I. |

## OTHER DEPARTMENTS.

While there is nothing special in the reports of several departments the work has gone on regularly and progress made in all lines of Agricultural Experimentation. Reports of special work will be found in Bulletins published during the year.

NEW BULLETINS ISSUED DURING 1914 BY THE COLLEGE STAFF.

No. 217.—Farm Poultry (No. 189 revised). Prof. W. R. Graham and A. C. McCulloch.
No 219.—The San José and Oyster-shell Scales. L. Caesar.
No. 220.—Lightning Rods. Prof. W. H. Day.
No. 221.—Food Value of Milk and its Products. Prof. R. Harcourt.
No. 223.—Fertilizers. Prof. R. Harcourt and A. L. Gibson.
No. 225.—Swine. Prof. G. E. Day.

## CHANGES IN STAFF.

In a staff as large as ours, it must be expected that there will be some changes each year. 1914 has proved no exception to the rule.

The following men have retired and accepted other positions:
H. L. Hutt, Professor of Landscape Gardening.
S. F. Edwards, Professor of Bacteriology.
T. D. Jarvis, Associate Professor of Entomology.
A. H. MacLennan, Demonstrator in Horticulture.
A McKay, Demonstrator in Cheese Making.

The following appointments or promotions have been made to fill these vacancies:

D. H. Jones becomes Professor of Bacteriology and T. H. Lund Lecturer in the same Department.

E. L. Davies, at present in the Bacteriological Department of the Massachusetts Agricultural College comes in as Demonstrator.

In the Entomological Department Mr. L. Caesar and Mr. A. W. Baker were promoted and Mr. G. J. Spencer brought in as Demonstrator.

In the Horticultural Department, two Demonstrators have been added this year, namely Mr. J. E. Britton and Mr. H. S. Fry, both graduates of the College.

### Graduates of the Science of Agriculture, 1914.

Allan, J. N., Canboro, Ont.
Barnet, I. T., Living Springs, Ont.
Bergey, J. E., Petersburg, Ont.
Blanchard, B. H. C., Baddeck, Cape Breton.
Britton, J. E., 54 Alexander Street, Toronto, Ont.
Brown, J. M., Girvan, Ayrshire, Scotland.
Carroll, J. A., Cowal, Ont.
Castro, H., 367 Alvenida Alvear, Buenos Aires, Argentine Republic.
Cleeves, A. C., Nanaimo, B.C.
Davis, L. M., St. Mary's, Ont.
Duff, G. C. M., Cookstown, Ont.
Forsyth, F., Glasgow, Ont.
Fry, H. S., Vineland, Ont.
Golding, N. S., Guelph, Ont.
Good, C. A., Brantford, Ont.
Hare, H. R., Grafton, Ont.
Hopkins, S. H., Guelph, Ont.
Hunter, W. T., Victoria, B.C.
Irvine, D. R., Habermehl, Ont.
Kelleher, M., 91 St. Joseph Street, Toronto, Ont.
Kingsmill, G. F., 152 Albert Street, London, Ont.
Kirk, H. R., Gledhow, Sask.
Knapp, J. S., Merrickville, Ont.
Laidlaw, C. M., Henfryn, Ont.
Lattimer, E., Burford, Ont.
Leppan, H. D., Reddersburg, O.F.S., S.A.
Madden, G. O., 7 Bedford Rd., Toronto, Ont.
McLaurin, A. E., Watson, Sask.
McRostie, J. E., Metcalfe, Ont.
Miller, J., Mt. Elgin, Ont.
Moore, J. A. C., Islington, Ont.
Mosely, L. A., Bayfield, Ont.
Neelands, C. F., Cobalt, Ont.
Ramsay, R. L., Bladworth, Sask.
Spencer, G. J., Yercaud, S. India.
Stanley, C. W., Granton, Ont.
Stansfield, N., Brighouse, Yorkshire, Eng.
Stark, J. W., Chatham, Ont.
Stewart, P., Beaverton, Ont.
Strong, W. F., Hilton, Ont.
Vining, R. L., Thorndale, Ont.
Winter, M. H., Wicklow, Ont.
Woltz, G. L., Hartford, Ont.

### Recipients of Associate Diplomas, 1914.

Abraham, R. H., Chatham, Ont.
Adair, L. C., Nottawa, Ont.
Aiton, R. M., Brown's Corners, Ont.
Altenburg, M. J., Gananoque, Ont.
Atkins, E. W. M., East Lansing, Mich.
Austin, W. J., Renton, Ont.
Baker, F. H. R., Port Dalhousie, Ont.
Beaumont, S. W., Bracebridge, Ont.
Bennett, W., Peterboro, Ont.
Binnington, D. J., Cataraqui, Ont.
Bird, W. J., 108 Eglinton Avenue W., North Toronto, Ont.
Booker, A. N., Aylmer, Ont.
Brown, C. S., R. R. No. 9, Peterborough, Ont.
Bryden, R. J., 880 Hellmuth Avenue, London, Ont.
Carncross, E. E., Cloverdale, B.C.
Carroll, D. E., R. R. No. 1, Iona Station, Ont.
Clemens, L. P., Oak Street, Galt, Ont.
Cotsworth, F. B., 231 Seventh Street, New Westminster, B.C.
Culp, E., Vineland Station, Ont.
Curran, H., Orillia, Ont.
Donaldson, J. R., 651 Gilmour Street, Ottawa, Ont.
Dougherty, J. L., E. Syracuse, N.Y.
Elgie, R. H., 448 Wellington Street, Sault Ste. Marie, Ont.
Elliott, D., Agincourt, Ont.
Elliott, G. A., Wingham, Ont.
Ellis, G. C., Florence, Ont.
Fancher, P. L., Florence, Ont.
Ferguson, C. D., Valetta, Ont.
Fitzgerald, E. J., St. Ives, Ont.
Foot, J. L., Longford Mills, Ont.
Foreman, E. C., Collingwood, Ont.
French, H. S., Vernon, B.C.
Gandier, B. P., Pelee Island, Ont.
Garlick, G., Grimsby E., Ont.

RECIPIENTS OF ASSOCIATE DIPLOMAS, 1914.—*Continued.*

Glavin, J. G., 124 Vernon Street, Worcester, Mass.
Gregg, A. H., 92 Forest Hill Road, Toronto, Ont.
Halpenny, W. H., Vars, Ont.
Harding, A., Lougheed, Alta.
Hare, W. E. Cobourg, Ont.
Hartley, C. V., 48 Brant Avenue, Brantford, Ont.
Hearle, Eric, Guelph, Ont.
Hessel, E. C., Vernon, B.C.
Herridge, H. W., Nakusp, B.C.
Huckett, H. C., Fairholme, S. Devon, Eng.
Hunter, R., Englehart, Ont.
Hurndall, I. B., Vancouver, B.C.
Jensen, E., Brandsdrift, S.A.
Jones, M., 459 King St., London, Ont.
Kirkley, F. R., Warkworth, Ont.
Knapp, C. E., Merrickville, Ont.
Knoop, M., Florence, Ont.
Lackner, C. E., Chesley, Ont.
Langley, B., Oak Ridges, Ont.
Lee, G. D., Stoney Creek, Ont.
Light, H. J., Lambeth, Ont.
Lindesay, H. H., Ottawa, Ont.
Locke, W. A., R. M. D., Brinston, Ont.
Lord, L., Penticton, B.C.
Lord, S. N., 35 Lakeview Avenue, Toronto, Ont.
Macdonald, W. P., New Lowell, Ont.
Mainse, C. A., Sweet's Corners, Ont.
Manton, W. D., Eglinton, Ont.
Maxwell, R. W., Orizaba, V.C., Mexico.
McClymont, A. C., Wabash, Ont.
McDermott, A. M., Saurin, Ont.
McLarty, J. E., Rodney, Ont.
Morse, T. W., 861 Bathurst Street, Toronto, Ont.
Murray, R., Deer Park, Ont.
Neff, H. W., Hamilton, Ont.
Oldfield, H. G., Claude, Ont.
Puleston, V. C., 65 Yonge Street, Toronto, Ont.
Reeker, F. S., Tuscarora, Ont.
Reilly, E. E., R. R. No. 4, Spencerville, Ont.
Sandy, E. S., Burkeville, Va.
Sauerbrei, Mark, Adanac Club, Winnipeg, Man.
Schuyler, D., Brantford, Ont.
Scott, W. H., Hastings, Ont.
Seitz, C. E., Reno, Nevada, U.S.A.
Sibbitt, G. L., Eric, Ont.
Skelton, R. J., R. R. No. 2, Tavistock, Ont.
Small, E. L., Wallacetown, Ont.
Steele, J. A., Almonte, Ont.
Stothers, S. B., Mafeking, Ont.
Stratford, R. K., Brantford, Ont.
Thompson, G.A., Guelph, Ont.
Townsend, D. G., Dundas, Ont.
Vahey, P., Newton Robinson, Ont.
VanEvery, W. S., R. R. No. 2, Welland, Ont.
Walker, R. J. C., Heriot Bay, B.C.
Walsh, F. W., 3 Grove Gardens, Isleworth, London, Eng.
Walther, G., Streetsville, Ont.
Waterman, S., Bensfort, Ont.
Welton, K., 59 Benlamond Avenue, E. Toronto, Ont.
Weston, E. W., 108 Queen St., Sarnia, Ont.
Whale, S. C., Goldstone, Ont.
Wheatley, C. C., R. R. No. 3, Sarnia, Ont.
White, A. H., Sardis, B.C.
Young, W. W., R. M. D., Brigden, Ont.
Yule, R. G., 21 Woolfrey Avenue, Toronto, Ont.

PROFESSIONAL DAIRY SCHOOL CERTIFICATES ISSUED DURING 1914.

Baxter, C., Orono, Ont.....Buttermaking
Cotton, Henry, Bright, Ont. .....Cheesemaking
Glass, F. M., Emerald, Ont.....Cheesemaking
Hammond, H., Monkton, Ont. .....Cheesemaking
Hammond, J. L., Tavistock, Ont.....Cheesemaking
Hill, J. A., Jarvis, Ont.....Buttermaking
McKinney, T. J., Bervie, Ont.....Buttermaking
Morrison, C. A., Whitechurch, Ont.....Buttermaking
Morse, M., Trowbridge, Ont.....Cheesemaking
Rogers, H., River Hebert, N.S.....Buttermaking
Skelton, R. J., Markdale, Ont.....Buttermaking
Stephenson, F. W., Brussels, Ont.....Buttermaking

LIST OF GRADUATES FROM HOME ECONOMICS COURSES IN 1914.

*Graduates of the Two-year Normal Course in Domestic Science:*

1. Miss Jeanette Babb.....Carlingford, Ont.
2. " Rae M. Black .....Hawkestone, Ont.
3. " Caroline Bredin .....Farran's Point, Ont.
4. " J. A. Pearl Graham.....Culross, Man.
5. " Eleanor M. Groff.....887 Grosvenor St., Winnipeg, Man.

6. Miss Helen Harrington .....117 Evelyn Crescent, Toronto, Ont.
7. " Fern Hotton .....168 Spring St., Sault Ste. Marie, Ont.
8. " Florence E. Irwin.....Markdale, Ont.
9. " Helen McMurtry.....90 Ominica St., Moose Jaw, Sask.
10. " Robena Montgomery.....309 Bethune St., Peterborough, Ont.
11. " Rhoda M. Ward .....Brampton, Ont.
12. " Isabella Weseloh.....82 Weber Street E., Berlin, Ont.

*Graduates of the One-year Normal Course in Household Science:*

1. Miss Estelle Cumming .....Cornwall, Ont.
2. " Annie M. Grassie.....Smithville, Ont.
3. " Myrtle A. Hayward .....Bridgetown, N.S.
4. " Mary Hiltz .....Dartmouth, N.S.
5. " Margaret McDougall .....St. Thomas, Ont.
6. " Frances McNally .....Fredericton, N.B.
7. " Alice B. Marcellus .....Morewood, Ont.
8. " Helene B. Pilkey.....107 Cross St., Chatham, Ont.
9. " Millie Smith .....Orono, Ont.
10. " Margaret Stewart.....R. R. No. 1, Hannon, Ont.

*Graduates of the Housekeeper Course:*

1. Miss Jean R. Cavers.....Carleton Place, Ont.
2. Mrs. Helena Hedley.....33½ McGill Street, Toronto, Ont.
3. Miss E. May Lees.....514 Gilmour Street, Peterborough, Ont.
4. " Burton Roulston .....Hagersville, Ont.

*Graduates of the Associate Course:*

1. Miss Margaret E. Hess.....158 Queen Street S., Berlin, Ont.
2. " Bessie E. McGregor.....350 Laurier Ave., Ottawa, Ont.
3. " Maude McLean .....370 Elgin Street, Ottawa, Ont.

*Graduates of the Homemaker Course:*

C. Homemakers.

1. Miss Louise Breithaupt.....172 Margaret Avenue, Berlin, Ont.
2. " J. Kathleen Campbell.....98 Admiral Road, Toronto, Ont.
3. " Sara Caskey.....411 Confederation Life Building, Toronto, Ont.
4. " Lillian Harvie.....Orillia, Ont.
5. " Sidna McDonald .....Picton, Ont.
6. " Mildred M. Ruby.....275 King Street W., Berlin, Ont.

A. Homemakers.

1. Miss Rhoda Byers.....187 Victoria Avenue, Chatham, Ont.
2. " Myrtle V. Carter.....Box 85, Lindsay, Ont.
3. " Helen K. Davidson.....R. R. No. 4, Peterborough, Ont.
4. " Jean E. Gardiner.....Sarnia, Ont.
5. " Mildred E. Kidd.....Aylmer, Ont.
6. " Sylvia H. Marshall.....258 Bay Street S., Hamilton, Ont.
7. " Winifred H. Palmer.....17 Church Street, Brantford, Ont.
8. " Anne I. Pringle.....184 Bay Street S., Hamilton, Ont.
9. " Muriel M. Whitaker.....5 Chatham Street, Brantford, Ont.
10. " Mabel S. White.....Milton, Ont.

B. Homemakers.

1. Miss Flossie Ahrens.....118 Queen Street S., Berlin, Ont.
2. " Hope F. Aylesworth.....Newburgh, Ont.
3. " Melene E. Davidson.....Seven Acres, Brantford, Ont.
4. " Leone A. Hartley.....78 Brant Avenue, Brantford, Ont.
5. " Anna McKinnon .....189 Court Street, Port Arthur, Ont.

SUMMARY OF ATTENDANCE IN 1914.

A.—January to June, completing the College year of 1913-1914.

1. *Normal Domestic Science:*
   - (*a*) Juniors of Two-year Course..... 14
   - (*b*) Seniors of Two-year Course..... 12
   - (*c*) Seniors of One-year Course..... 10

2. *Associate Course—Two-year Course:*
   (*a*) Juniors . . . . . 12
   (*b*) Seniors . . . . . 8

3. *Housekeepers—Two-year Course:*

   (*a*) Juniors . . . . . 10
   (*b*) Seniors . . . . . 4
4. *Homemakers—One-year Course* . . . . . 43
5. *Short Course in Domestic Science:*
   (*a*) Winter term students . . . . . 22
   (*b*) Spring term students . . . . . 22
6. Optional . . . . . 9
7. Student-workers . . . . . 3
8. Public School students . . . . . 89

B.—September to December, opening the College year of 1914-1915.

1. *Normal Domestic Science—Two-year Course:*
   (*a*) Juniors . . . . . 14
   (*b*) Seniors . . . . . 14
2. *Normal Household Science—One-year Course* . . . . . 10
3. *Associate Course—Two-year Course:*
   (*a*) Juniors . . . . . 9
   (*b*) Seniors . . . . . 5

4. *Housekeepers—Two-year Course:*
   (*a*) Juniors . . . . . 10
   (*b*) Seniors . . . . . 12
5. *Homemakers—One-year Course* . . . . . 38
6. *Short Course in Domestic Science* . . . . . 25
7. *Optional* . . . . . 8
8. *Student-workers* . . . . . 2
9. *Public School students* . . . . . 64

C.—Students counted in both above lists:

1. *In long courses* . . . . . 42
2. *In Public School classes* . . . . . 13

D.—Total number of students in 1913 . . . . . 381
Total number of students in 1914 . . . . . 414

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## MEDALS, SCHOLARSHIPS AND PRIZES AWARDED APRIL, 1914.

### First Year Scholarships.

Scholarships of $20 in money were awarded for groups of subjects in First Year work as follows: Highest standing with a minimum of forty per cent. of the marks of each subject, and an aggregate of seventy-five per cent. of the total number of marks allotted to the subjects in the group:

Group 1.—English and Mathematics.—A. H. Cowan, Napanee, Ont.

Group 2.—Animal Husbandry, Dairying, Field Husbandry, Veterinary Science.—E. G. Rowley, Aldershot, Ont.

Group 3.—Botany, Chemistry, Geology, Manual Training, Physics, Zoology.—J. C. Neale, Lambeth, Ont.

Group 4.—Apiculture, Horticulture, Poultry.—R. C. Elder, Canfield, Ont.

### The George Chapman Scholarship.

(A prize of $20 in books awarded on the work in English of the first two years.)

The three divisions of the work under the English Department are taken into consideration in awarding the prize, namely, English Literature, English Composition and Public Speaking. Winner in 1914: L. P. Clemens, Galt, Ont.

### Prizes.

Three prizes of the value of $10 each in books were awarded as follows:

One to the second year student who composed and read before a committee the best essay on a subject assigned for the year, viz., "Poultry Raising as a Business".—W. Bennett, Peterborough, Ont.

One to the student who stood first in General Proficiency on first and second year work—Theory and Practice—L. P. Clemens, Galt, Ont.

One to the student who ranked highest in general proficiency and obtained first class honors in his major subjects in the fourth year.—C. W. Stanley, Granton, Ont.

### Canada Industrial Scholarships.

*First*—$50.00—B. H. Blanchard, Baddeck, N.S.
*Second*—$30.00—S. H. Hopkins, Guelph, Ont.
*Third*—$20.00—R. L. Vining, Thorndale, Ont.

### Medals.

*Governor-General's Silver Medal*: First in General Proficiency, first and second year work, 1913-14. Winner: L. P. Clemens, Galt, Ont.

All of which is respectfully submitted

G. C. CREELMAN.
*President.*

Macdonald Institute and Hall.

Modern New Dairy Barn—Ontario Agricultural College.

# FINANCIAL STATEMENT, 1914

## COLLEGE DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Salaries and wages | $81,843 50 |
| Servants' pay list | 4,470 54 |
| Meat, bread, groceries, laundry, engine room supplies, and fuel | 38,346 14 |
| Advertising, printing, postage and stationery | 3,998 28 |
| Expenses, Short Courses | 1,698 76 |
| Temporary assistance | 1,993 88 |
| Student labor | 4,412 31 |
| Travelling expenses and extra lectures | 1,921 94 |
| Library | 1,999 56 |
| Expenses, Stock Judging Team | 200 00 |
| Scholarships | 110 00 |
| Telephone service, rents, etc. | 548 60 |
| Furnishings and repairs | 6,079 34 |
| Sewage | 540 00 |
| Contingencies | 1,349 33 |
| Maintenance, five laboratories and gymnasium | 7,666 01 |
| Total Expenditure | $157,178 19 |
| Less Revenue | 43,575 37 |
| Net Expenditure | $113,602 82 |

### Revenue.

| | |
|---|---|
| Board | $24,496 60 |
| Tuition and laboratory fees | 17,402 50 |
| Chemical analyses | 430 00 |
| Rent of rooms | 104 50 |
| Rent of cottages | 230 00 |
| Rent of Post Office boxes | 41 00 |
| Supplemental examinations | 232 00 |
| Fines and breakages | 596 22 |
| Sundries | 42 55 |
| Total Revenue | $43,575 37 |

### Student Labor.

(12 months.)

*Total per Month.*

| | |
|---|---|
| October 11th to 31st | $638 02 |
| November 1st to December 6th | 1,126 55 |
| January | 633 31 |
| February | 552 69 |
| March | 456 71 |
| April | 87 59 |
| June | 99 58 |
| July | 12 22 |
| September and October | 805 64 |
| Total | $4,412 31 |

*To Different Departments.*

| | |
|---|---|
| College | $309 16 |
| Chemical | 32 33 |
| Botanical | 33 57 |
| Bacteriology | 61 89 |
| Physical | 71 14 |
| Entomology | 15 70 |
| Gymnasium | 5 75 |
| Library | 18 92 |
| Nature Study | 7 03 |
| Farm Department | 1,427 26 |
| Experimental | 885 43 |
| Dairy | 27 99 |
| Poultry | 319 40 |
| Pomology | 394 80 |
| Landscape gardening | 257 76 |
| Mechanical | 416 90 |
| Apiculture | 127 28 |
| Total | $4,412 31 |

## MACDONALD INSTITUTE AND HALL.

### Expenditure.

| | |
|---|---|
| Salaries and wages | $20,956 50 |
| Servants' pay list | 2,274 58 |
| Meat, bread, groceries, furnishings, repairs, engine room supplies, fuel, and labor on grounds | 17,099 85 |
| Maintenance of laboratories in Institute | 3,248 00 |
| Library and stationery | 746 24 |
| Total Expenditure | $44,325 17 |
| Less Revenue | 24,252 69 |
| Net Expenditure | $20,072 48 |

### Revenue.

| | |
|---|---|
| Board | $15,520 80 |
| Tuition and laboratory fees | 8,595 00 |
| Supplemental examinations | 14 00 |
| Fines and breakages | 106 89 |
| Sundries | 16 00 |
| Total Revenue | $24,252 69 |

## FARM DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Permanent improvements | $960 05 |
| Wages of men, foreman and stenographer | 9,398 12 |
| Purchase and maintenance of stock | 9,392 32 |
| Farm maintenance, including repairs, blacksmithing, binder twine, seed, furnishings, fuel, light, advertising, printing, stationery, tools, implements, etc. | 2,699 76 |
| Contingencies | 343 69 |
| Total Expenditure | $22,793 94 |
| Less Revenue | 11,280 46 |
| Net Expenditure | $11,513 48 |

### Revenue.

| | | |
|---|---|---|
| Sale of Cattle:— | | |
| 16 Calves at from $1.50 to $50.00 | $387 00 | |
| 8 Cows at from $30.00 to $75.00 | 400 00 | |
| 3 Heifers at $50.00 | 150 00 | |
| 2 Steers at from $60.00 to $75.00 | 135 00 | |
| 3 Bulls at from $164.00 to $236.00 | 600 00 | |
| 23 Cattle, 29,675 lbs. at from $8.25 to $13.00 | 2,716 11 | |
| | | $4,388 11 |
| Sale of Pigs:— | | |
| 133 Pigs, 7,025 lbs. at from $5.00 to $8.75 cwt. | $594 16 | |
| 8 Sows at from $25.00 to $35.00 | 270 00 | |
| 12 Boar pigs at from $10.00 to $15.00 | 135 00 | |
| | | 999 16 |
| Sale of Sheep:— | | |
| 13 Lambs, 1,550 lbs. at $7.50 cwt. | $116 25 | |
| 3 Sheep at $10.00 | 30 00 | |
| | | $146 25 |

| | | |
|---|---|---|
| Sale of Milk:— | | |
| 13,825 quarts at 4c. | $553 00 | |
| 116,112 lbs. at $1.60 cwt. | 1,857 79 | |
| 3,543.22 lbs. fat at from 24c. to 35c. | 979 66 | |
| | | 3,390 45 |
| Service of animals | | 148 00 |
| Sale of Potatoes:— | | |
| 600 bags at 80c. | $480 00 | |
| 500 bags at 50c. | 250 00 | |
| | | 730 00 |
| Sale of 17½ bushels barley at 75c. | | 13 13 |
| Feed of 24 horses for 1 year at $50.00 | | 1,200 00 |
| Sale of wool, 531 lbs. at from 17½c. to 19½c. | | 97 23 |
| Sale of 9,177 feet lumber at from $15.00 to $20.00 per M. | | 156 67 |
| Sundries | | 11 46 |
| | | $11,280 46 |

## EXPERIMENTAL DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Permanent improvements | $613 81 |
| Assistant, specialist in plant breeding, stenographer, foreman, teamsters and laborers | 13,432 06 |
| Seeds, manure and special fertilizers | 893 59 |
| Furnishings, implements, repairs, blacksmithing, etc. | 897 53 |
| Printing, postage, stationery and contingencies | 471 86 |
| Feed of horses | 200 00 |
| Total Expenditure | $16,508 85 |

## DAIRY DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Permanent improvements | $274 94 |
| Wages, including foreman, cheesemaker, buttermaker, engineer, stenographer and bookkeeper, assistant and official tester of dairy cattle. | 3 363 50 |
| Purchasing, hauling and manufacturing milk into butter and cheese | 3,100 64 |
| Furniture, furnishings, repairs, etc., laboratory expenses, gas, chemicals, etc., and contingencies | 999 22 |
| Fuel and light | 298 52 |
| Total Expenditure | $8,036 82 |
| Less Revenue | 4,310 26 |
| Net Expenditure | $3,726 56 |

### Revenue.

| | |
|---|---|
| Sale of cheese, 16,017 3-16 lbs. at from 10c. to 50c. | $2,469 11 |
| Sale of butter, 123 lbs. at from 15c. to 27c. | 26 37 |
| Sale of cream, 1,636½ quarts at 25c. | 409 13 |
| Sale of ice cream, 66⅛ gallons at from 80c. to $1.20 | 53 80 |
| Sale of butter fat, 2,803.14 lbs. at from 25c. to 34c. | 811 06 |
| Sale of skimmilk and buttermilk, 186,881 lbs. at from 20c. to 25c. cwt. | 386 29 |
| Sale of milk, 25 quarts at 4c. | 1 00 |
| Sundries | 13 50 |
| Rent | 140 00 |
| Total Revenue | $4 310 26 |

## DAIRY SCHOOL.

### Expenditure.

| | |
|---|---|
| Wages of instructors, engineer, janitor, stenographer and bookkeeper..... | $2,384 50 |
| Cleaning, painting, repairs and contingencies ..... | 298 75 |
| Dairy appliances, separators, vats, expenses cheese and butter judges, inspecting factories, etc. ..... | 439 59 |
| Advertising, printing, stationery, books, papers, etc..... | 89 37 |
| Fuel and light ..... | 576 20 |
| Purchase of milk for cheesemaking and cost of hauling milk and cream.. | 3,342 83 |
| Total Expenditure ..... | $7,131 24 |
| Less Revenue ..... | 1,441 41 |
| Net Expenditure ..... | $5,689 83 |

### Revenue.

| | |
|---|---|
| Sale of cheese, 2,313½ lbs. at from 13c. to 50c..... | $418 20 |
| Sale of cream, 489 quarts at 25c..... | 122 25 |
| Sale of ice cream, 58¾ gallons at from 80c. to $1.60..... | 53 60 |
| Sale of butter fat, 1,881.50 lbs. at from 35c. to 36c..... | 675 92 |
| Fees . . . ..... | 160 00 |
| Sundries . . . ..... | 11 44 |
| Total Revenue ..... | $1,441 41 |

## POULTRY DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Wages of assistant, stenographer and temporary assistance..... | $2,366 05 |
| Furnishings and repairs ..... | 997 98 |
| Permanent improvements ..... | 99 02 |
| Purchase of stock ..... | 299 10 |
| Fuel, light and contingencies ..... | 1,098 42 |
| Experiments with incubator, fattening and feed..... | 4,499 74 |
| Feed of horse ..... | 50 00 |
| Total Expenditure ..... | $9,410 31 |
| Less Revenue ..... | 5,456 84 |
| Net Expenditure ..... | $3,953 47 |

### Revenue.

| | | |
|---|---|---|
| Sale of Live Poultry, 374 live birds for ..... | | $636 75 |
| Sale of Dressed Poultry, 7,188 15-16 lbs. at from 12c. to 75c..... | | 1,312 59 |
| Sale of Eggs for Hatching:— | | |
| 554½ settings for ..... | $743 55 | |
| 27,363 eggs at from 3½c. to 20c. each..... | 1,276 81 | |
| | | 2,020 36 |
| Sale of Eggs for Domestic Use:— | | |
| 5,051 7-12 dozen at from 15c. to 50c..... | | 1,482 59 |
| Sundries . . . ..... | | 4 55 |
| Total Revenue ..... | | $5,456 84 |

## POMOLOGY DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Permanent improvements | $494 73 |
| Foreman, fireman, stenographer, teamsters and laborers | 3,999 98 |
| Manure, trees, plants, bulbs, implements, tools, furnishings, repairs and contingencies | 1,999 93 |
| Fuel and light | 378 15 |
| Feed of horses | 200 00 |
| Total Expenditure | $7,072 79 |
| Less Revenue | 832 52 |
| Net Expenditure | $6,240 27 |

### Revenue.

| | |
|---|---|
| Sale of Fruit and Vegetables, as per statements rendered monthly | $832 52 |

## LANDSCAPE GARDENING DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Permanent improvements | $186 73 |
| Foreman, assistant, fireman, teamsters, stenographer and laborers | 3,898 72 |
| Manure, trees, plants, bulbs, seeds, tools, furnishings, repairs and contingencies | 949 86 |
| Fuel and light | 420 47 |
| Feed of horses | 100 00 |
| Total Expenditure | $5,555 78 |

## MECHANICAL DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Salary of foreman | $1,000 00 |
| Tools, furnishings and repairs | 246 21 |
| Total Expenditure | $1,246 21 |

## APICULTURE DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Equipment, maintenance and wages | $1,748 35 |
| Less Revenue | 135 00 |
| Net Expenditure | $1,613 35 |

### Revenue.

| | |
|---|---|
| Sale of Bees:— | |
| 8 Colonies bees at $10.00 | $80 00 |
| 11 3 lb. packages bees at $5.00 | 55 00 |
| Total Revenue | $135 00 |

## SOIL PHYSICS DEPARTMENT.

| | |
|---|---|
| Services and expenses of temporary assistants in connection with Farm Drainage Demonstrations | $4,000 00 |

## FORESTRY DEPARTMENT.

### Expenditure.

| | |
|---|---|
| Contingencies | $159 70 |

## SUMMARY.

| | Expenditure. | Revenue. | Net Expenditure. |
|---|---|---|---|
| College | $157,178 19 | $43,575 37 | $113,602 82 |
| Macdonald Institute and Hall | 44,325 17 | 24,252 69 | 20,072 48 |
| Farm | 22,793 94 | 11,280 46 | 11,513 48 |
| Experimental | 16,508 85 | ..... | 16,508 85 |
| Dairy | 8,036 82 | 4,310 26 | 3,726 56 |
| Dairy School | 7,131 24 | 1,441 41 | 5,689 83 |
| Poultry | 9,410 31 | 5,456 84 | 3,953 47 |
| Pomology | 7,072 79 | 832 52 | 6,240 27 |
| Landscape Gardening | 5,555 78 | ..... | 5,555 78 |
| Mechanical | 1,246 21 | ..... | 1,246 21 |
| Apiculture | 1,748 35 | 135 00 | 1,613 35 |
| Soil Physics | 4,000 00 | ..... | 4,000 00 |
| Forestry | 159 70 | ..... | 159 70 |
| | $285,167 35 | $91,284 55 | $193,882 80 |

S. SPRINGER,
*Bursar.*

# REPORT

OF THE

# Ontario Veterinary College

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1915

Printed by
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Corner Queen and John Streets
TORONTO

*To His Honour,* Sir John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

*Lieutenant-Governor of the Province of Ontario.*

May it Please Your Honour:

I have the pleasure to present herewith for the consideration of Your Honour the Report of the Ontario Veterinary College, for the year 1914.

Respectfully submitted,

JAMES S. DUFF,

*Minister of Agriculture.*

Toronto, 1915.

# ONTARIO VETERINARY COLLEGE

## COLLEGE STAFF

E. A. A. Grange, V.S., M.Sc., Principal.
Contagious Diseases, Veterinary Hygiene.

T. G. Brodie, M.D., F.R.S., University of Toronto.
Physiology.

C. G. Saunders, V.S., B.V.Sc., 419 Spadina Avenue.
Anatomy, Surgery, Canine and Feline Diseases.

J. A. Amyot, M.B., 4 Laburnam Ave.
Bacteriology.

J. N. Pringle, M.R.C.V.S., B.V.Sc., 13 Ferrier Ave.
Sporadic Diseases of Horses and Cattle, Dentistry, Principles of Horse-shoeing.

D. King Smith, M.D., V.S., 22 Wellesley Street.
Pathology, Parasitology, Milk Inspection.

L. T. Addison, B.A., M.D., 431 Broadview Avenue.
Biology, Histology, Pathology.

Paul L. Scott, M.B., 19 Avenue Road.
Pharmacy.

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C. A. Temple, M.D., C.M., 398 Palmerston Boul.
Materia Medica.

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Botany.

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Demonstrator.

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Demonstrator.

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Demonstrator.

A. R. B. Richmond, V.S., B.V.Sc.
Demonstrator.

S. A. Cudmore, B.A. (Oxon), 115 Howland Ave.
Tutorial Instructor.

J. E. Anderson, 37 Salisbury Ave.
Executive Clerk.

# Report of the

# Ontario Veterinary College, 1914

*To the Honourable* James S. Duff, *Minister of Agriculture, Toronto.*

Sir,—I have the honour to submit the following report of the Ontario Veterinary College for the year ending the 31st October, 1914.

The various College exercises were conducted in the earlier months of the year in the original building on Temperance St., Toronto, but the progress made in the erection of the new college building on University Avenue was so advanced that it was ready for occupation before the close of the fiscal year.

During the summer months of 1914 when the College was not in session, preparations for removing our museum and other equipment were commenced and sufficient progress made to enable the College to open the session of 1914-15 in the new premises, and the great advantage of increased accommodation and better equipment manifested itself from the first in all departments of our course.

The following description of the new building together with the accompanying illustrations may give a good idea of the capacity and other details of the new College, which consists of a four-storey, fireproof, steel-framed structure with basement L-shaped in plan, covering an area of 10,077 sq. ft., with a total cubic capacity of 898,500 cu. ft., and a maximum height of 85 ft. The external walls are of red brick above a stone channelled ashlar storey. The brick-work is relieved by cut stone dressings and the whole is surmounted by a heavy projecting cornice and parapet wall above. All internal walls where not of brick are of hollow tile and all floors are of reinforced concrete.

The main entrance in the centre of the University Facade is approached by a flight of steps leading to the ground floor, which is 10 ft. above the street level. Entrance to the basement is provided off a lane for horses, etc., two additional emergency exits are provided, one at the rear and one at the south. All stairs are of metal with patent mastic noiseless treads. Corridors and lavatory floors are laid with terrazzo floor with sanitary base.

*Heating and Ventilating.*—The building is heated throughout by steam supplied from two 18 ft. tubular boilers, fresh air is supplied through metal ducts to each room and corridor, direct from the outside, first passing through water filter screen and over a steam battery. The foul air is extracted by fan through metal ducts and discharged above the roof. All steam radiators are regulated by "Thermostat" temperature control.

*Lighting.*—The building throughout is lighted by electricity. The window and skylight illumination contains about 1,000 square yards of glass.

*Accommodation.*—The accommodation on the various floors is as follows:—

*Basement.*—Boiler room 67 ft. 6 in. by 27 ft. 6 in. is provided with coal vault, engineer's and carpenter's workshop, transformer room and apartments for groom.

Ontario Veterinary College, 110 University Avenue, Toronto, Canada.

First Year Class at work in the Anatomical Laboratory.

The stable is provided with six loose boxes and ten standing stalls, all with modern stable fittings, it is provided with ample daylight and has two direct accesses to the outside, with pharmacy and harness room adjoining one of the entrances. A weighing machine is operated in the pharmacy. Accommodation for small animals is also provided.

The operating room in the basement opens direct to the stable and is arranged as an amphitheatre with stock and operating tables for large and small animals, and seated for 200 students, and can be used as an arena for stock judging and kindred subjects. From this floor an electric elevator with cage 9 ft. 3 in. by 13 ft. 2 in. travels up through all other floors, capable of carrying a load of 4,000 lbs., and arranged so that animals can be conveniently taken to any room in the building.

*Ground Floor.*—This floor, as already stated, is 10 ft. above the sidewalk and is given up largely to administrative offices, including principal's rooms, bookkeeper's office, with vault and four other offices, including post office. At the rear is a feed room; caretaker's apartments; coat rooms and lavatories.

A laboratory on the right of the entrance is 54 ft. by 42 ft. and is lighted on three sides. Leading from the entrance hall is the main staircase which continues up through the building.

*First Floor.*—The first floor consists of a bacteriological laboratory 54 ft. by 42 ft. arranged to accommodate 113 students at tables fitted with copper conical sinks, one to each two students, electric lamp, microscope and Bunsen burner is supplied to each student. Three sterilizers controlled by steam and one incubator and one refrigerator are provided in this room. Each student has provided for his use a locker in centre of room. This laboratory, as well as all others throughout the building, has a preparation room equipped for those in charge of the class. A class room on this floor is seated as an amphitheatre for 175 students. The assembly hall is provided with platforms and portable folding seats to accommodate 500 students.

The Faculty room is furnished with writing desks and chairs for use of the staff.

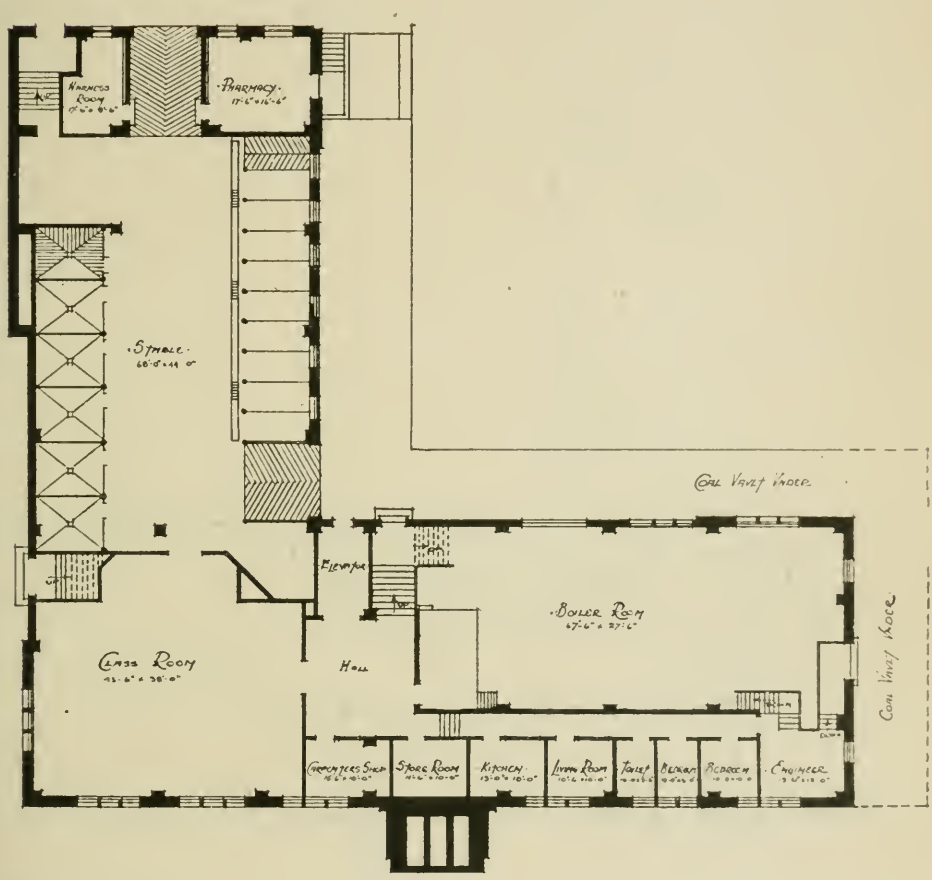
*Second Floor.*—The second floor provides laboratory of the same size as on floor below, equipped for microscopic and other scientific studies in histology, and different branches of biology.

A class room on this floor is arranged the same as the one on the floor below.

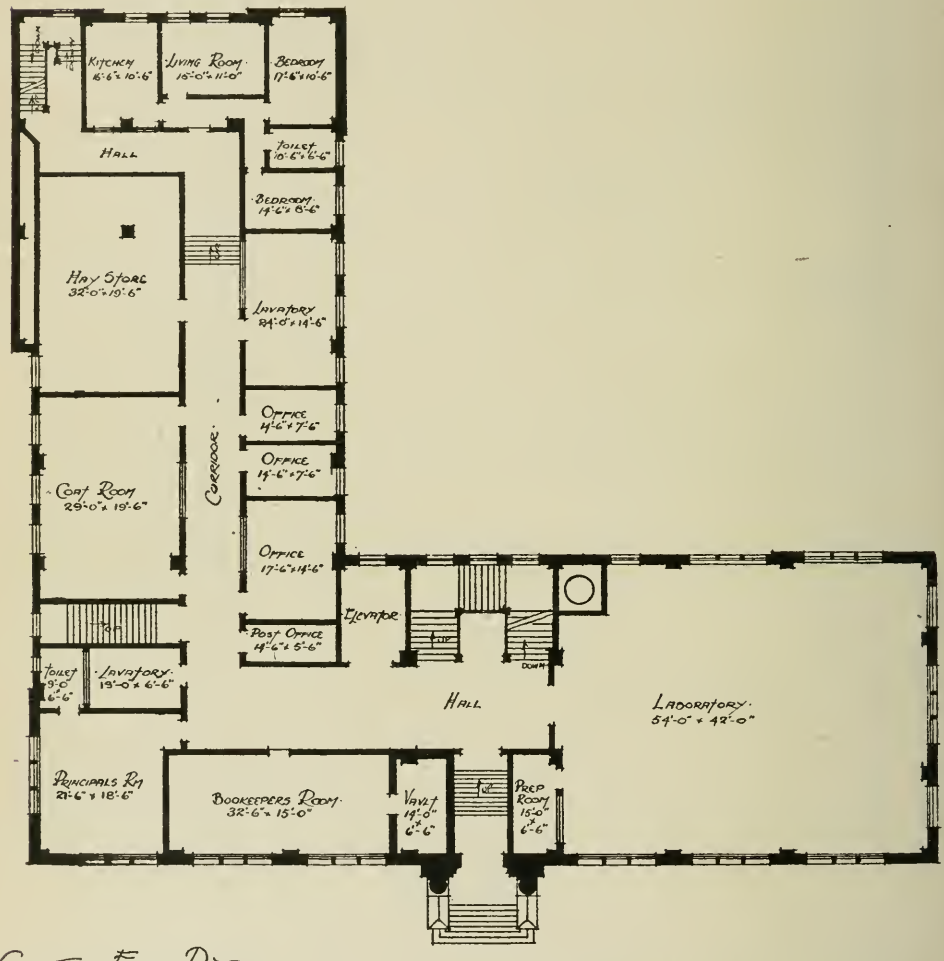
Library 31 ft. 6 in. by 14 ft. 6 in. is furnished with wall book cases and numerous books.

The museum 64 ft. 6 in. by 48 ft. is furnished with glass cases framed in metal for the protection of numerous and valuable specimens. A room for general storage of laboratory equipment.

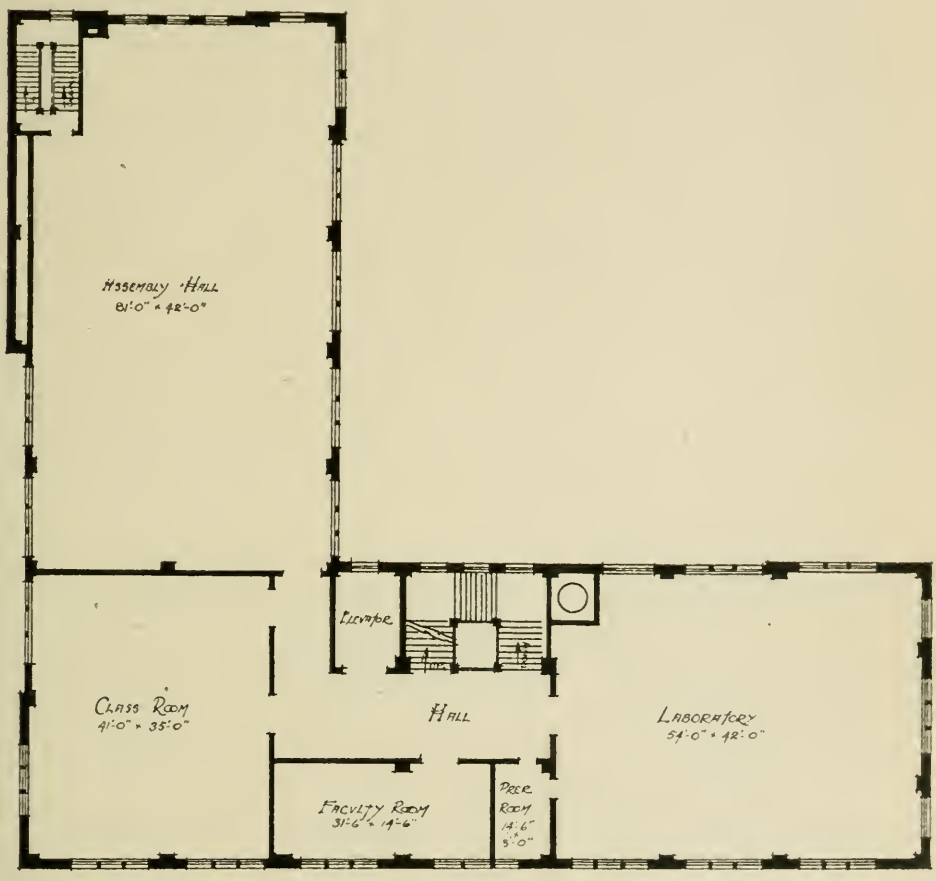
*Third Floor.*—Pharmaceutical laboratory 54 ft. by 42 ft. is fitted for 121 students at benches with lockers under, and shelf for bottles over; a porcelain sink is fitted between each two benches. A lecturer's bench is arranged at one side. This room is lighted on three sides and also from a skylight. The Anatomical laboratory, 106 ft. by 35 ft., is finished with a drained granolithic floor and is lighted on three sides and also from the roof by skylight 66 ft. long and 23 ft. wide, and is furnished with 15 white enamelled, shaped and drained metal dissecting tables on ball-bearing castors. Each table is 9 ft. by 3 ft. and



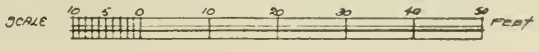

Basement Plan.

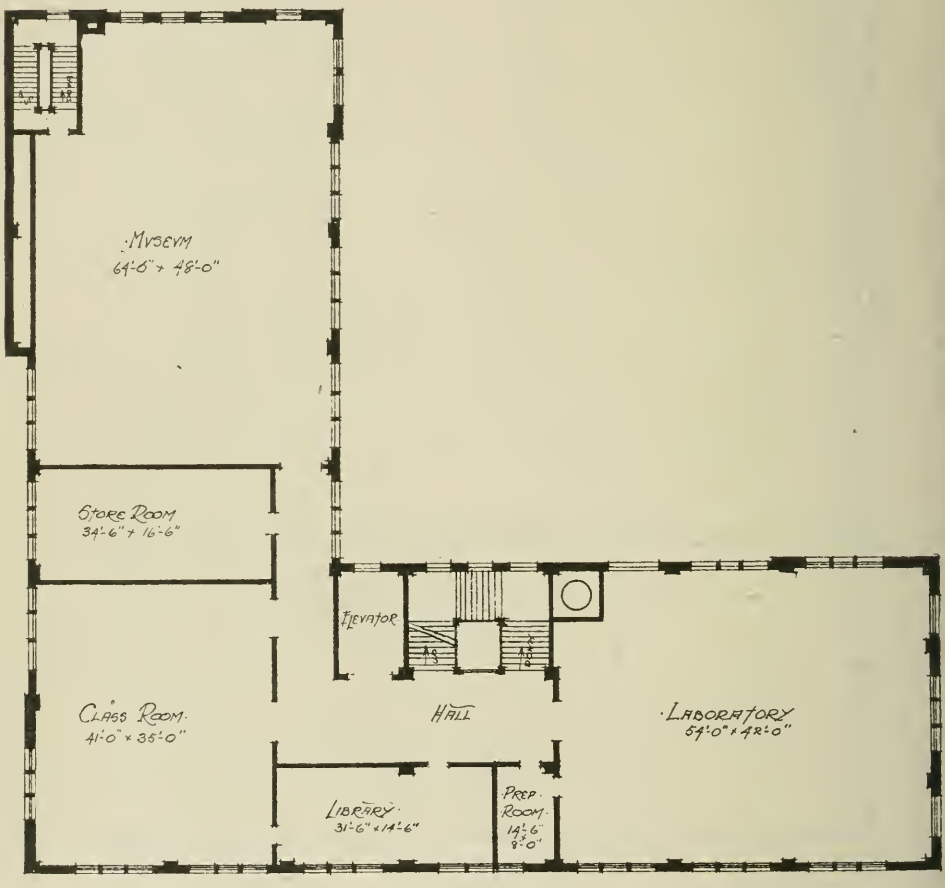



Ground Floor Plan.



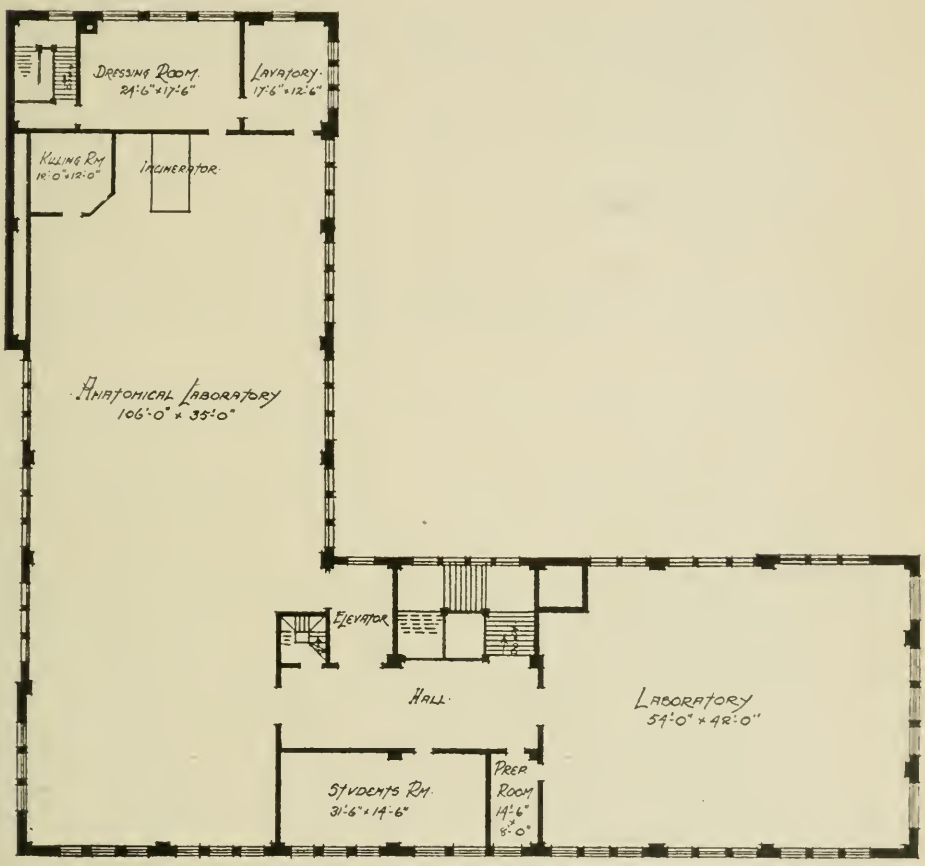

First Floor Plan






SECOND FLOOR PLAN

SCALE. 10. 5. 0. 10. 20. 30. 40. 50. FEET




Third Floor Plan.

Scale. 10 6 0 10 20 30 40 50 Feet.

capable of carrying 1,500 lbs. An arrangement of chains hung from the lower cords of roof trusses can be used to support the limbs of animals on the dissecting tables at convenient angles and carry part of the weights.

The killing room off this laboratory is 12 ft. by 12 ft., has floor drained into special blood catch pit. A ring in the floor is provided for slaughtering purposes. An incinerator operated with gas is used for the cremation of carcases, and large enough to consume two horses at one and the same time.

A dressing room for students and suitable lavatory are arranged off this laboratory, the former is fitted with racks for students' apparel.

Each of the class rooms and laboratories is furnished with special screens to be used for stereopticon illustration, the necessary electric wall plugs being provided.

As an extra precaution against fire the building is fitted with fire extinguishers and hose reels.

Throughout the building a local telephone service is installed and connected up to various rooms.

The accompanying illustrations aid in making the foregoing description clearer.

Class exercises and demonstrations were conducted throughout the year according to the plan of the following time-tables.

## TIME TABLE OF LECTURES AND DEMONSTRATIONS

The following programme of lectures and laboratory demonstrations was conducted at the times specified during the two terms of the College year:—

**FALL TERM** **FIRST YEAR**

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 8-9 A.M. | Tutorial Class Assembly Hall | Tutorial Class Assembly Hall | | | Tutorial Class Assembly Hall | Tutorial Class Assembly Hall |
| 9-10 " | Anatomy Room B | Sporadic Diseases of Horses Room B | Chemistry at University | Chemistry at University | Anatomy Room B | Anatomy Room B |
| 10-11 " | Section A Histology Laboratory C | Section B Histology Laboratory C | Chemistry at University | Chemistry at University | Pharmacy Room A | Parasitology Room B |
| 11-12 " | Section A Histology Laboratory C | Section B Histology Laboratory C | Chemistry at University | Chemistry at University | Zoology Room B | Materia Medica Room B |
| 1-2 P.M. | Study | Study | Study | Histology Room C | Study | Study |
| 1-4 " | Section B Zoology Laboratory C | Study | Study | Study | Section A Zoology Room C | |
| 2-3 " | | | | Equine Dentistry, Room B | | |
| 1.30-3 " | | | Amphitheatre Clinic | | | |
| 2-5 " | Section A Botany at University | | Tutorial Class Assembly Hall 3-4 p.m. | Tutorial Class Assembly Hall 5-6 p.m. | Section A Botany at University | |
| 4-6 " | | | Pharmacy Room A 4-6 p.m. | | | |

SUBJECT TO CHANGE

FALL TERM — SECOND YEAR

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 8-9 A.M. | Tutorial Class Assembly Hall | Tutorial Class Assembly Hall | | | Tutorial Class Assembly Hall | Tutorial Class Assembly Hall |
| 9-10 " | Materia Medica Room D | Anatomy Room D | Pathology Assembly Hall | Physiology at University | Pathology Assembly Hall | Physiology at University |
| 10.30-11.30" | | | | | | Anatomy Quiz Assembly Hall |
| 10-11 " | Anatomy Room D | Sporadic Diseases of Horses Room D | Materia Medica Room D | Anatomy Quiz 10.30-11 a.m. Assembly Hall | Sporadic Diseases of Horses Room D | |
| 11-12 " | Contagious Diseases Room D | Contagious Diseases Room D | Cattle Diseases Room D | Bacteriology Room D | Bacteriology Room D | |
| 1-5 P.M. | Dissection | Dissection | Dissection | Clinic | Dissection | |
| 5-6 " | | | | Tutorial Class Assembly Hall | | |
| 4-6 " | | Physiology at University | | | | |
| 3-4 " | | | Tutorial Class Assembly Hall | | | |

SUBJECT TO CHANGE

FALL TERM — THIRD YEAR

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 9-19 A.M. | Materia Medica Room D | Veterinary Hygiene Assembly Hall | Surgery Room D | Equine Dentistry Room D | Veterinary Jurisprudence Room D | Laboratory Pathology Laboratory C |
| 10-11 " | Dairy Inspection Assembly Hall | Sporadic Diseases of the Horse Room D | Materia Medica Room D | Surgery Room D | Sporadic Diseases of Horse Room D | Canine and Feline Diseases Room D |
| 11-12 " | Contagious Diseases Room D | Contagious Diseases Room D | Cattle Diseases Room D | Bacteriology Room D | Bacteriology Room D | Zootechnics Room D |
| 1-4 P.M. | Study | Clinic | Section A Microscopic Pathology Laboratory C | Section B Microscopic Pathology Laboratory C | Study | Study |
| 4-6 " | Section A Bacteriology Laboratory E | Section A Bacteriology Laboratory E | Study | Section A Bacteriology Laboratory E | Section A Bacteriology Laboratory E | Study |

SUBJECT TO CHANGE

SPRING TERM FIRST YEAR

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 8-9 A.M. or 5-6 P.M. | Tutorial Class Room D 5-6 | Tutorial Class Room D 8-9 | Tutorial Class Room D 8-9 | Tutorial Class Room D 5-6 | Tutorial Class Room D 8-9 | Tutorial Class Room D 8-9 |
| 9-10 A.M. | Anatomy Room B | Sporadic Disease of Horse Room B | Chemistry at University | Chemistry at University | Anatomy Room B | Anatomy Room B |
| 10-11 " | Section A Histology Laboratory C | Section B Histology Laboratory C | Chemistry at University | Chemistry at University | Pharmacy Room B | Parasitology Room B |
| 11-12 " | Section A Histology Laboratory C | Section B Histology Laboratory C | Chemistry at University | Chemistry at University | Zoology Room B | Materia Medica Room B |
| 1-4 P.M. | Dissection | Dissection | Dissection | Dissection | Dissection | Dissection |
| 4-6 " | | | Pharmacy Laboratory A | | | |
| 4-5 " | Dentistry Room B | | | | Clinic Amphitheatre 4-6 | |

SUBJECT TO CHANGE

SPRING TERM SECOND YEAR

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 8-9 A.M. or 5-6 P.M. | Tutorial Class Room D 5-6 | Tutorial Class Room D 8-9 | Tutorial Class Room D 8-9 | Tutorial Class Room D 5-6 | Tutorial Class Room D 8-9 | Tutorial Class Room D 8-9 |
| 9-10 A.M. | Materia Medica Room D | Anatomy Room D | Pathology Room F | Physiology at University | Pathology Room F | Physiology at University |
| 10-11 " | Anatomy Room D | Sporadic Disease of Horse Room D | Materia Medica Room D | Anatomy Quiz Room B | Sporadic Disease of Horse Room D | 10.30-11-30 Anatomy Room F |
| 11-12 " | Obstetrics Room D | Contagious Diseases Room D | Contagious Diseases Room D | Bacteriology Room D | Bacteriology Room D | |
| 1-4 P.M. | Section A Histolory or Pathology Laboratory C | Section B Histology or Pathology Laboratory C | Section A Histology or Pathology Laboratory C | Clinic Amphitheatre | Section B Histology or Pathology Laboratory C | |
| 5-6 " | | Physiology University | | | | |

SUBJECT TO CHANGE

SPRING TERM THIRD YEAR

| Hour | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 9-10 A.M. | Materia Medica Room D | Study Hour | Horse Shoeing Amphitheatre | Sporadic Diseases Room D | Study Hour | Pathology or Milk Inspection Room D |
| 10-11 " | Study Hour | Sporadic Diseases of Horse Room D | Materia Medica Room D | Regional Anatomy and Surgery Amphitheatre | Sporadic Diseases Room D | Canine and Feline Diseases Room D |
| 11-12 " | Obstetrics Room D | Contagious Diseases Room D | Contagious Diseases Room D | Bacteriology Room D | Bacteriology Room D | Zootechnics Room D |
| P.M. | | | Horse Shoeing Amphitheatre 1.30-3 | Practical Meat Inspection 4 Students 1-1.30 | Practical Meat Inspection 4 Students 1-1.30 | |
| 3-4 " | Lecture Meat Inspection Room D | Clinic Amphitheatre 2-4 | Lecture Meat Inspection Room D 4-5 | | | Stock Judging |
| 4-6 " | Laboratory E Bacteriology Section B | Laboratory E Bacteriology Section B | | Laboratory E Bacteriology Section B | Laboratory E Bacteriology Section B. | |

SUBJECT TO CHANGE

Total number of students in the past fiscal year from the various countries as enumerated below from October, 1913, to November, 1914.

| Canada | United States | Great Britain | Other Countries | Total |
|---|---|---|---|---|
| 235 | 87 | 4 | 6 | 332 |

Registered from Ontario during same period, total 91.

On the 24th of April 81 students were graduated, and granted the degree of Veterinary Surgeon (B.S.) from the College, on the 5th June 9 members of the class received the degree of Bachelor of Veterinary Science (B.V.Sc.) and one member of the class of 1911 received the degree of Doctor of Veterinary Science (D.V.Sc.) from the University of Toronto.

## PRIZE ESSAYS.

Given by the College to the student who prepares the best report of a case treated by him during the summer vacation of 1914 while under the supervision of a Preceptor. The essay to be read and defended before the Science Association of the College.

A separate prize is given to each of the first and second year classes.

The committee in charge of the essays awarded the prize of the first year to W. A. Robertson, and the prize of the second year to J. E. Mumford.

The case treated by each student possesses so many points of general interest that the essays are included in this report.

Section of the Third Year Class, attending a clinic on a horse in the Operating Room of the College.

A section of the Third Year Class, assembled for work in the Bacteriological Laboratory.

## ESSAY OF THE FIRST YEAR STUDENT.

About 9 a.m. on May 15th last, a Galician farmer, residing five miles from town, called for my Preceptor to attend a parturition case, and he having been called elsewhere I decided to undertake the case.

On arriving at the farm I found the patient (a four-year-old brown mare, weighing about 1,300 lbs.) lying in a recumbent position in the farmyard, with the head, shoulders, and front part of the fœtus delivered in a natural position, and the fœtus dead. On enquiry as to the history of the case I was informed that the mare had started to foal about 5.30 a.m. the same day, and had very little trouble in delivering the fœtus to the position in which I found it. The owner was of the opinion that it was coming all right and had endeavoured to pull it away. Failing in his manual efforts he hitched a horse to the front legs of the fœtus, but this only had the effect of dragging the mare and leaving the position of the fœtus unchanged. It was only after the mare had been dragged about 30 feet that he thought something must be seriously wrong and came to town to get veterinary assistance. On learning of this I administered what I considered to be well merited admonition.

I diagnosed the case as one having one or both hind legs flexed at the hock, and thus causing the fœtus to become wedged at the pelvic brim. I tried to make a vaginal examination by insertion of the arm, but could not do so owing to the swollen condition of the vagina which caused it to cling tightly to the fœtus. I severed the skin of the fœtus right around the body about two inches from the patient's vulva, and with my hand separated it from the body as far back as the pressure of the Mare's vulva would permit; then disjointed the vertebræ and removed the front end of the fœtus. I next removed with my hands the remaining ribs and contents of the thoracic and abdominal cavities, and pulled the skin tightly over the severed end of the fœtus and sutured it. I afterwards washed the protruding end of the fœtus, and the lips of the patient's vulva with a five per cent. solution of creolin, and with the parturition crutch returned the fœtus to the uterus.

On examination I discovered that instead of pushing the remaining part of the fœtus into the uterus, I had tipped it with the sutured end up. I found that the hind feet had punctured the uteris just below the os uteri and had scraped the tissues off the pubis leaving a portion of the bone bare, and that they were now lodged in a pocket in the tissues. By the aid of the parturition crutch I pushed the portion of the fœtus further into the uterus and succeeded in tipping it completely over, and with the crutch held the fœtus while I released the hind feet and brought them through os uteri, and so delivered the remaining portion of the fœtus, hind feet foremost. The fœtal membranes came away with the colt and there was very little hæmorrhage.

I disinfected my hands and examined the rents in the vagina. Found that the uterus was punctured just below the os uteri, and that the tissues had been torn from the pubis, extending from just inside the pelvic brim for a distance of about three inches backwards. The hind feet of the fœtus had been lodged in two pockets made by them in the tissues of the floor of the pelvic cavity. On examining these rents more closely I found that the feet had entered separately, but that posteriorly both feet had been in one pocket.

As my patient was very weak and the pulse soft I administered: digitalin gr.i hypodermically before proceeding to flush out the uterus and vagina with a tepid one per cent. solution of creolin, washing the uterus and syphoning it out three times and taking particular care to see that the rents on the floor of the vagina were made as asceptic as possible. I then pressed all the fluid out of the rents made by the feet of the fœtus and placed the tissues as nearly as possible in position. I then placed over them six yards of cheese cloth (which had been boiled for fifteen minutes) taken directly out of boiling water and dipped into a one per cent. creolin solution. This packing I kept in place by inserting a quart bottle into the vagina. In order to prevent the patient from expelling the bottle through straining I had a collar and harness put on the mare, with crupper running from the hames and two straps attached to crupper passed between the hind limbs, under the abdomen, between the front limbs and attached to the collar. The neck of the bottle was attached to the straps by means of a cord, which could be untied to permit of the bottle being removed at any time when required. I did not think that the patient would strain to remove the packing from the vagina, but to meet this possible contingency I left with the owner:

Chloral Hydrat., ℥ii
Aqua ad., ℥xxiv.

and directed him to give half, if required, the remainder to be administered two hours afterwards if necessary. I also left potassium nitrate ℥vi., to be given with bran mash in ℥i doses, three times daily: I told the owner to give the mare all the water (with chill off) she desired, not to feed any oats, but to give a moderate diet of hay or grass; to blanket the patient and to avoid standing her in a draught.

At 5 p.m. the same day I returned and found the mare looking better and apparently eating with relish. Pulse soft, 50 per minute; temperature 100.5. I removed the packing, flushed out the uterus and vagina with a one per cent. solution and re-packed with fresh cheesecloth as I had done previously. The owner stated that the mare had seemed quite easy all day and had made no efforts to eject the packing.

On May 16th and 17th I visited the patient three times daily, removing and substituting the packing on each occasion and flushing out the uterus and vagina as I had done on the 15th. On the occasion of these latter visits the pulse and temperature were practically normal. I instructed the owner when on my last visit on the 17th to feed half a gallon of oat chop with the bran mash and to gradually increase this until the patient was getting her usual feed. On the 18th and 19th I made visits twice daily and flushed out the uterus and vagina each time, but discontinued the packing as the torn parts of the vagina appeared to be healing nicely, and staying in place. On the evening of the 19th I notified the owner that, as I had not detected and did not now anticipate any ill effects from any toxins which might have been absorbed where the mucous membrane was severed I considered the patient out of danger and therefore would not call again.

Some two weeks after I had discontinued attendance on this case I was informed by the owner that the recovery of the mare had been complete and uneventful.

W. A. Robertson.

A section of the Third Year Class, attending a clinic on a small animal in the Operating Room of the College.

First Year Class assembled for work in the Pharmaceutical Laboratory.

## ESSAY OF THE SECOND YEAR STUDENT.

The case I beg to submit for consideration is one of complete dissolution of the continuity of the tendinous portions of the Flexors Pedis Perforans and Perforatus muscles at the upper part of the inferior thirds.

History.—The history obtained disclosed that the mare, six years old, weight nine hundred and fifty pounds, while being worked on a plow on the morning of May sixth, bit her mate, which kicked, striking the animal in question on the right pelvic limb, internally, below the tarsus, inflicting a deep wound which produced little hæmorrhage considering its extent.

The owner applied first aid remedies and attempted to get her to the barn, but after going a few steps the fetlock suddenly touched the ground, the toe turned upwards and control of the foot was lost.

After considerable labor the owner managed to get her to his stables and called in his veterinarian, who recommended her destruction; not satisfied, he later called in another whose advice was the same; about this time I heard of her—May twenty-third—and had her removed to my preceptor's infirmary in his ambulance.

Diagnosis.—Rupture of the above mentioned tendons, but leaving the vessels and nerves intact.

I reached the conclusion that the primary injury did not completely sever the tendons, but when the animal's full weight was placed upon the limb that part of the tendons which remained intact ruptured, but the vessels and nerve being more elastic were not affected. This is borne out by the fact that the animal went a few steps before the toe turned up and that the foot always remained sensitive to a pin-prick.

Prognosis.—Favourable.

Treatment.—A brace was made. It consisted of an ordinary shoe with inverted heel calks, in which bolt holes were driven to contain the bolts which held the two upright arms. These arms were again secured superiorly by a circular piece of steel running around the limb and fastening anteriorly with a strap and buckle.

Under the buckle was placed a large soft pad to prevent undue pressure on the Internal Metatarsal vein, and Anterior Tibial artery.

These held the brace in position.

To support the limb two well padded straps were run from the external arm round the posterior part of the limb to the internal arm of the brace and buckled one above and one below the seat of injury.

When the weight of the limb was thrown against them they were held in position, but could be conveniently moved up or down each day to prevent stasis of the superficial circulation and thus prevent chafing.

The simplicity of the arrangement allowed for further treatment in the way of oft-repeated massaging with a stimulating liniment.

Outcome.—After five weeks recovery was deemed far enough advanced to warrant the removal of the brace, and the animal stood in a normal position.

To further facilitate resolution an ordinary mercuric blister was applied.

Recovery was complete with little thickening and the slight lowering of the fetlock will soon be remedied by the well-known pathological action of scar tissue shrinking with time. This will bring the fetlock back to its normal position.

That the recovery was complete was demonstrated by lifting the limb, flexing the foot, and feeling the tendons play below the hock. On October fifth the mare was driven to a buggy. J. E. MUMFORD.

While reading and defending this essay before the Science Association of the College the author was enabled through the aid of a stereopticon to illustrate special points of interest.

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During the year regular meetings of the Science Association were held in the College and business conducted according to the following:

## CONSTITUTION AND BY-LAWS OF THE SCIENCE ASSOCIATION OF THE ONTARIO VETERINARY COLLEGE.

### ARTICLE I.

This Association shall be known as THE SCIENCE ASSOCIATION OF THE ONTARIO VETERINARY COLLEGE.

### ARTICLE II.

This Association shall at all times be under the direction and control of the Ontario Veterinary College.

### ARTICLE III.

This Association has for its object the promotion of fraternal feeling, and by scientific intercourse to further the advancement of veterinary knowledge among its members.

### ARTICLE IV.

Any student in good standing of the third year class of the Ontario Veterinary College shall be eligible to membership in this Association, provided that any student suspended or expelled from the Ontario Veterinary College shall cease to be a member of this Association for a like period.

### ARTICLE V.

The officers of this Association shall consist of an Honorary President, who shall be the Principal of the Ontario Veterinary College, one active President, one Vice-President and a Secretary-Treasurer.

### ARTICLE VI.

It shall be the intent of this Association to hold one meeting each week during the school year.

### ARTICLE VII.

This Association shall confer upon each member a certificate of membership in the Association, under the following provisions:

(*a*) That he shall be a graduate of the Ontario Veterinary College.
(*b*) That he shall prepare and present at regular meetings of this Association two essays consisting of not less than five hundred or more than one thousand words each, on subjects of special interest to the veterinary profession; and that these essays shall be open to discussion at the meetings at which they are read.

Such certificates shall be signed and conferred by the Honorary President and active President and Secretary-Treasurer of this Association.

### ARTICLE VIII.

The fee for membership in this Association shall be $2, payable on or before Dec. 1st of each years.

Class attending a lecture on Sporadic Diseases.

First Year Class assembled for work in the Chemical Laboratory.

## BY-LAWS.

### Article I.

The nomination of officers shall take place annually at the first meeting of the school year, and their election shall be by vote of the members present.

### Article II.

The President shall conduct all proceedings of this Association in accordance with Parliamentary usage. He shall appoint all committees unless otherwise ordered by special resolution.

### Article III.

In the absence of the President, his duties shall devolve upon the Vice-President.

### Article IV.

The Secretary-Treasurer shall keep correct minutes of the meetings of the Association. He shall also receive and pay out all moneys of the Association, with the consent of its members; rendering a correct account of the same.

### Article V.

The Honorary President shall preside at all meetings of this Association wherein there are discussions of essays; and in his absence, shall designate a member of the faculty of the Ontario Veterinary College or other suitable person to act in his stead.

### Article VI.

The fees collected by the Secretary-Treasurer shall be deposited within a bank for the purpose of safe keeping under name of above Association.

### Article VII.

At the end of the fiscal year the funds remaining in the treasury shall be used in whatever way two-thirds of the members of the third year class, who are members of this Association, shall agree to be most advantageous.

### Article VIII.

At the end of the year the business material of the Association shall be turned over to the Honorary President until the officers for the succeeding year be elected when above material shall be turned over to the Secretary-Treasurer.

### Article IX.

Two thirds of the enrolled members of the third year class, who are members of this Association shall constitute a quorum for the transaction of business.

## BRIEF SYNOPSIS OF METHODS ADOPTED IN TEACHING VARIOUS BRANCHES OF VETERINARY SCIENCE IN THIS COLLEGE.

*Contagious Diseases of Animals.*—Is taught by lectures illustrated with diagrams, diseased tissues, and when possible, with infected animals.

*Veterinary Hygiene.*—Taught by lectures, illustrated with materials used in promoting health; and observations in the Veterinary Infirmary of the College.

*Sporadic Diseases of Animals.*—Embracing the various diseases which are not regarded as contagious. Their causes, symptoms and treatment will be thoroughly described in lectures, illustrated with numerous specimens now in the Museum of the College, also with affected animals as they occur from time to time in the practice of the Infirmary.

*Veterinary Anatomy.*—Is taught first by descriptive lectures in the Class Room, and the applied science by a full course of dissection in the commodious dissecting room near the main building of the College.

*Veterinary Surgery.*—Is taught first in the Class Room by illustrated lectures, and the applied science or practical work of the course is freely demonstrated in an amphitheatre fitted for the purpose.

Physiology.—Includes a course of about 60 lectures on the physiology of domestic animals, in which the following subjects are discussed, viz.: The blood and phenomena of clothing; the circulatory mechanism of the heart and blood vessels; physiology of digestion and absorption of foods; chemical characters of different foods; digestive secretions; digestions in different parts of the alimentary tract: respiration and mechanism of the organs concerned; the physiology of ductless glands; neuro-muscular mechanism; the central nervous system; the production of heat in the body and the regulation of body temperature; the central nervous system and functions of the chief parts of the brain; the physiology of the special senses; the physiology of the kidney and the other excretory organs.

*Veterinary Materia Medica.*—Embraces a description of the most important drugs and agents used in the cure of disease and the alleviation of pain, including their actions, uses, and doses for the various domestic animals. The practical teaching of this branch of the course is conducted in a suitable Pharmacy, as well as in the stalls of the infirmary. The lectures for the first year are largely directed to the actions and uses of medicines.

*Veterinary Pathology.*—The course in this subject extends over two years and includes a series of lectures and laboratory demonstrations, both macroscopic and microscopic. The lectures are divided so that general pathology is taken up the first year, and the following year is devoted to special pathology. Gangrene; degeneration; infiltrations; inflammation; tumors; cysts; hypertrophy; atrophy and bone diseases, are some of the subjects which will be discussed.

Second Year Class assembled for a lecture in Physiology.

A section of the Second Year Class assembled for work in the Histological Laboratory.

*Veterinary Histology.*—Is taught by illustrated Class Room lectures, all of which will be demonstrated in a spacious room for the purpose, and the student will be required to prepare, mount, stain and examine with the aid of a microscope various tissues in health, including the blood of various domestic animals.

*Veterinary Obstetrics.*—Is taught by a full course of lectures, illustrated with large diagrams and numerous instruments used in the practice of this most important art.

*Post Mortem Demonstrations.*—Is conducted by descriptive lectures and autopsies, on subjects procured for the purpose, in the amphitheatre of the College.

*Bacteriology.*—This branch of the College course receives full consideration in numerous lectures in which special attention is given to technique in preparing and studying certain micro-organisms or germs, especially those which are believed to cause disease. The study of toxins, and the preparation of anti-toxins, vaccines and other biological products are extensively discussed and demonstrated. An extended laboratory course is given in this subject.

*Chemistry.*—Is taught by lectures and a course of laboratory instruction.

*Zoology.*—Is taught by illustrated Class Room lectures, and by laboratory methods. Much time is spent in the study of the Protozoa and the like.

*Botany.*—Is taught by lectures in the Class Room. The applied science is taught by laboratory methods and from specimens procured in the field.

*Parasitology.*—Is taught in the Class Room and the practical feature of the subject is illustrated by specimens, drawings and dissections made by the student in a laboratory equipped for that purpose.

*Veterinary Dentistry.*—This branch of our course is fully discussed in illustrated lectures in the Class Room, and the practical education of the student in the art is fully demonstrated in the amphitheatre.

*Breeds and Breeding of Domestic Animals.*—Is taught by lectures illustrated by diagrams in the Class Room, and living animals at famous Stock Yards in the vicinity of Toronto.

The Calendar of the College contains full instructions for students entering, class lists, college fees, copies of examination papers and list of studies.

I have the honour to be,

Sir,

Your obedient servant,

E. A. A. GRANGE,

*Principal.*

# APPENDIX.

## THE GRADUATE AND THE COUNTRY.

**An address delivered at the Commencement Exercises of the Ontario Veterinary College, Toronto, in Convocation Hall of the University of Toronto, April 24th, 1915, by the Honourable William Renwick Riddell, L.H.D., F.R.Hist.Soc., etc., Justice of the Supreme Court of Ontario.**

I desire to begin by congratulating you on the tremendous advance made by Veterinary Surgery during the last few years—not alone on the advance of the science but also on the advance in public estimation of its practitioners. In my youth—now indeed more remote than that of most—*cheu fugaces labuntur anni*—there was hardly such a person as the Veterinary Surgeon. Every blacksmith in the country was a horseshoer and therefore a farrier, and consequently a horse doctor *ex-officio*. He was "ever . . . . furnished with horseshoes, nayles and drugges both for inward and outward applycation," as old Francis Markham in his "Booke of War" said three hundred years ago "an excellent Smith or Farrier" should be. There was indeed an occasional instance where some more or less unknown individual supported himself in a precarious existence by "horse-doctoring" alone, but the cases were rare. Horse doctors, smith or otherwise, all burned for the lampas (which they invariably called "lampers"), blistered for a splint and bled for pretty much everything, the fleam being always handy. Everyone of them had his own cure for bots, ranging from sweet oil and turpentine to an exclusive regimen of timothy hay and carrots. But this was not to be wondered at—the farmer was an exception who, being pressed, would not modestly admit that he had an infallible cure himself, which he would perhaps disclose; but in any case he had a pitying smile for any other treatment than his own. Almost the same remarks apply to "hollow-horn" in cattle. Very few indeed were so greatly daring and bravely iconoclastic as an old friend of mine who always said "You insure me against hollow-belly and I'll insure myself against hollow-horn."

No one exercising the trade had been scientifically educated: the practice was a very bad form of empiricism and quackery, and the worst feature of all was that no one could understand that there was or could be advantage from a knowledge of the physiology of animals or from a careful training in scientific principles. I well remember that when my brother determined to attend the Ontario Veterinary College in the middle seventies, there were many shakings of the head and friendly expostulations at the utter waste of the money paid to learn to be a "horse doctor." What did not come by instinct could be learned from the blacksmith or the neighbours, so why pay out good money?

Largely owing to the Ontario Veterinary College, to the work of Dr. Andrew Smith, his colleagues, successors and students, the whole system has changed within my recollection. Rule of thumb has given way to scientific accuracy, so far as scientific accuracy can be attained in such matters. Anatomy, physiology, pathology, pharmacology, bacteriology, have come to their own in veterinary as in human medicine and surgery. The trade has become a profession: and what of necessity follows and is perhaps the most important matter, the practitioner has ceased to be the nondescript, little-regarded horse doctor, and has become the respected and self-respecting Veterinary Surgeon, the man of science, the member of a learned profession.

That there are exceptions, is true. There is here and there a member of your profession who has not sloughed off the ignorant boor: there are those who, having passed their examinations, proceed to forget all they safely can or may, and retain just enough to enable them to make a living. But such there are in every profession—in medicine, in law—and probably there is no greater proportion in yours than in any other. There is the tobacco-chewing, whiskey-drinking student and practitioner: there is the individual, student or practitioner, who imagines he shows himself wholly admirable when he acts the rowdy and larrikin: but then I have seen the like at Osgoode Hall, and I am not sure that the medical college is wholly free from them, and possibly not even the solemn halls of Knox. The fool ye have always with you; and "though thou shouldest bray a fool in a mortar among wheat with a pestle, yet will not his foolishness depart from him."

There are black sheep in every flock, but it can, I think, be fairly said that the graduates of this College have, with very few exceptions, borne themselves as becomes them, in view of their opportunities.

I do not hope to influence the unworthy, but shall address myself only to those who respect themselves and their calling, and who will not refuse to obey the command "freely ye have received, freely give."

"Every one owes a debt to his profession": so said the wisest, brightest, meanest of mankind, Lord Bacon. It should be the aim of every member of every profession to leave it better and more advanced than he found it; at the very least that it will suffer no discredit, much less dishonour, through him and his life. But it is not that of which I am to speak: it is the duty of the graduate toward his country; and here I find no difference between the graduates in veterinary surgery and in any other course.

In our system, painfully wrought out through the centuries, the product of the thought of sages, the valour of heroes, the blood of martyrs—the real source of all power is the people; and we English-speaking people pride ourselves upon our democracy. There may be—there is—some little difference between our citizens in their views as to how far the will of the people may be checked, temporarily at least: but there is none in the thorough conviction that the will of the people must prevail when that will is quite clear and is unmistakably expressed. Numbers of us call themselves Conservatives, but the most conservative of the Conservatives is far in advance of where the most radical of the Radicals stood no long time ago. The most ardent Reformer of the Tudor or Stuart time would gasp at the freedom permitted now by the most reactionary political party.

The people must—and does—rule. But what is the people?

No doubt when voters come to deposit their ballots in the ballot box they say what is in their mind at the time. This may be the result of improper inducements: money, promise of positions, what not. All such are to be deprecated: any one who votes for any such cause is a traitor to himself and to his fellow citizens. By the law made by and for the citizens, he is entrusted with a voice in the affairs of the country, a vote to express that voice. This is given him not that he may make money out of it, not even that he may benefit himself by it, but that he may use it for the benefit of the country at large. Let me illustrate. Many thousands of Canadians believe in Protection. If any man thinks that Protection will benefit him pecuniarily there is a duty cast upon him to vote for Protection if he also thinks that it will benefit the country at large; but if he honestly thinks that it

will injure the country generally, he is a traitor to his trust if he votes for it simply because it will or may benefit himself. Thousands and tens of thousands of Canadians are convinced Free Traders. If one of them believes that Free Trade will put or leave money in his pocket and at the same time be good for Canada he is wholly entitled to vote Free Trade; but if, thinking it good for his own pocket, he thinks it bad for the country, he is recreant to his trust if he tries by his vote to bring it about.

Of course, near as a man's shirt is to him, nearer still is his skin, and it is no easy task to discriminate between one's own gain and his country's. It is a matter of infinite difficulty to see clearly when one's own advantage is concerned. We are too prone to consider every public question from our own point of view, the point of view of personal advantage. When we are told that we should aim at the "greatest good of the greatest number," we are too apt to consider that the greatest number is Number One. Now just here is one of the duties of the graduate toward his people. Your education has been of such a character as to "scientize" your minds, to make your thinking scientific and based on principle. Unless you have quite failed to take advantage of the training which you have undergone you must be able to take a broad view of all matters, and to discriminate between the merely personal and the general. Your duty is the same as that of all other citizens of Canada, but your education has—or should have—better fitted you to perform it.

There is, however, another and a higher duty which you owe your country, and that is, to exercise a beneficial influence on others. In all communities there must be leaders. If the educated do not assume that position, others less well-qualified must and will. I am sick and tired of the talk—largely cant—heard too often in educated circles, about the "party politician," the "ward politician," the "boss" and the like. If those who should lead abdicate their rights let them hide their heads and not whine if those whom they consider their inferiors come to the front and pick up the baton which they have declined. And most of our politics must be party politics—there is no other way we English-speaking peoples have discovered whereby we may govern ourselves, than the party system; and every good as well as every ill, politically, has been and must be brought about by political parties. To refuse to take part in politics because it involves partyism is like refusing to belong to a church because it must be of one creed or another and cannot include all Christians.

Disinclination is often shown—or at least expressed—to join in politics because of some supposed degradation involved in political pursuits, as though the exercise of rights for which hundreds of our ancestors have fought and died were something unworthy. Some superfine people distinguish between the politician whom they affect to contemn and the statesman whom they unaffectedly admire. The main difference is that the statesman is dead. The *laudator temporis acti* naturally lauds the dead and gone, and cannot or will not appreciate the living and actual.

Dirty politics? Yes, there is dirty politics just as there is dirty theology—the *odium theologium* is proverbial—just as there is dirty law and dirty medicine. No one has a right to refuse to take part in politics because politicians abuse each other unless he would refuse to be a clergyman or a lawyer because the members of these professions, in their conduct towards each other, are not always perfect

ensamples of sweetness and light. In like manner no one has a right to avoid his share of public duty because it is difficult, full of perplexities—because it may not be possible to see clearly the very best thing to do—any more than one does not refuse to become a doctor because his science is not fully developed and he cannot cure all diseases, or a lawyer because he cannot win every case.

Let me here say a word for municipal politics. Our municipalities, which a Governor who did not like them called "sucking republics," are the very nursery of self-government. The matters dealt with in our municipal councils are such as touch our daily life and no small part of our comfort and happiness depends upon the wisdom of alderman or councillors. We are all prone to grumble at our municipal rulers—grumbling is an inalienable right of every freeman, and God forbid that we should stop grumbling. But someone must do this municipal work; if you think you can do better, say so, state your reasons and try your hand. There is no disgrace in being a municipal politician, but the reverse, unless you are a municipal politician with no vision above the petty advantage to be gained by yourself or a clique or a party by your being such a politician. The municipal problem is necessary and no man is too good for the job.

Whether in Municipal, Provincial or Dominion matters, the graduate should establish his leadership if he can, if he is the best qualified to lead; and he should be thus qualified unless he has missed his opportunities and wasted his time.

He should be, and unless he has not been educated as he ought, he must be capable of directing the thought of those not so well qualified along the right lines. "Let all thy ends be thy country's." It is unfortunately the case that much of our Canadian politics has tended toward depreciation of political opponents, their principles, their objects, their actions. Perhaps in some cases the criticism was justified and proper, but surely it is time to cut away from old feuds and face the facts as they are. The old way with religious sects was for each to assail every other. That time has to a very great extent gone by, and now any church shows its greatness by advancing the cause of Christianity and elevating humanity, not by captious criticism of, much less furious assault on, the other churches. May we not at this long last unite in advancing our common country without captious criticism of, or furious assault upon, those of a different political creed? I do not mean by this, that anyone should give up any part of his own political belief any more than the Presbyterian gives up any part of his religious belief when he joins hands with the Anglican, the Methodist or the Baptist. The essential loyalty to Canada and British connection of the great mass of the people no one doubts and that should unite all Canadians in one family.

At the present time we are at war, and more than ever we should be one people. You should do your best to make that aspiration a solid fact.

But there is now a most pressing duty not known to us in times of peace; a duty different in kind, not simply in degree.

We are now in the midst of a world war for democracy, for the rule of the people.

The right to govern ourselves, whether we do that well or ill, is the birthright of all the English-speaking people, the aspiration of all those in the world whether they speak English or not, whose views of human liberty are those of Hampden and Pym and the heroes of 1688.

That all power rightfully proceeds from the people and that all power must be exercised in a responsibility to the people is the cardinal principle of our British folk. Now compare that with the Prussian ideal—I say Prussian, because it is the Prussianism infecting Germany which makes Germany dangerous to-day.

The Emperor loudly and emphatically contends—he does not *contend* in Germany, for no one says him nay—that he draws his power from God alone and that his dominion over the people is of divine right, to deny which is blasphemy as well as treason. Our King is glad and proud to owe his throne to an Act of Parliament, and to admit that an Act of Parliament could take it from him. The Kaiser despises all Acts of Parliament (except those which grant him money) and says "God alone gave me my throne—my people have nothing to do but to obey; they have no right to deprive me of what I do not in any sense owe to them." A personal rule more absolute than was ever claimed by Charles the First or his son James, more absolute than England has ever seen since Queen Elizabeth's time, broods over Germany, the gift of Prussia.

It was because a mere subject might not be more than a mere servant that the pilot was sent overboard, Bismark was cashiered. Just think what it would mean to us, if the King were to dismiss Asquith because he used his own judgment wisely, and thereby acquired public favor, or if the Governor-General were to dismiss Sir Robert Borden, or the Lieutenant-Governor Mr. Hearst.

Parliaments the German Empire has—in some cases, elected in large measure by the classes—but no Parliament can dictate or change a policy; all that Parliaments can effectively do is to vote money.

In municipal matters the rule is almost equally arbitrary. In the municipalities as in the Empire the government is effective, the peace is kept, peculation is rare, the people's money husbanded, but, throughout, the people have nothing to say; they have to do simply as they are told, obey this regulation and that and have not even the right to grumble at their masters. Comfort and reasonably cheap living are attained, but at the sacrifice of initiative, of spontaneous thought, of freedom, of everything involved in the word "democracy"—the phrase "government by the people."

Now if the Prussians were content to apply their principles to themselves and their own land only, we would have no right to complain. Our American cousins may take up one year out of four in the turmoil and anxiety, the dislocation of business and uneasiness of a Presidential election; they may rejoice in a system which does not permit taking the opinion of the electorate except at times rigidly and unchangeably fixed by a written document; they may reverence their Constitutions, etc., in what seems to us a most undemocratic way. That is their own business; and it would be a sheer impertinence in any but an American to criticize; they do not seek to impose their system upon others, and so have the right to expect others to leave it alone in word and in deed.

The Prussian has imposed his system, in fact, upon all Germany, and makes no concealment—or at least until but the other day made no concealment—of the doctrine he entertained that he was to mould the world to his ways, that he was the predestined regulator of the affairs of all peoples.

It is the unutterable and colossal self-conceit of the Prussian which is the real danger threatening the world to-day. He first, with his doctrine of divine right, places the Kaiser very little if any lower than the Almighty; then, as a necessary consequence, proclaims that the State, personified in the Kaiser, does not exist for the individual but the individual for the State. By an easy gradation

he arrives at the conclusion that this divinely guided State owes no duties to any other State, that it is a law unto itself, that what it desires, territory or otherwise, it should take, and that weaker nations have no right to exist. But it is *his* Kaiser, *his* State, of which this is predicated, and he gladly and conscientiously finances against a Russian Czar or a British King. He is moved to righteous indignation at the thought that any other nation should exercise the privilege of taking anything belonging to Germany or which she wants, whether it be the food or munitions of war she so much desires, or the territory of East Prussia or German Poland; but he has no qualms in annexing an Alsace or a Lorraine and, if he could, a Belgium, or in exploiting the mines and factories as well as the people of occupied territory.

He, the Prussian, is the Superman, the more than man, and no one has any rights which he is bound to respect. His ways are the right ways; all others are but the feeble movement of the imbecile or the rudeness of the barbarian.

These ideals necessarily work out in principles of International conduct. Instead of the great and unchangeable rules of the moral law, which we are taught are binding upon nations as well as upon individuals, he has boldly adopted as the cardinal rule: "Might makes right, might is right, what I can, I ought and will."

No treaty will bind him, for what is a treaty but an agreement which is advantageous to him when made, but when it is no longer so, is for that reason alone not binding on him? A Belgium whose neutrality he has guaranteed must give up that neutrality if it is inconvenient for him; let the other guarantors look out for themselves, but let the guaranteed bow before him and his might. No scrap of paper stands or can be allowed to stand in his way. The good old rule sufficeth him:

> "The simple plan,
> That they should take who have the power
> And they should keep who can."

It is this conception of the German as Superman, instead of a mere survival of the primæval and mediæval, which has made the nation drunk with conceit, blind to all justice and right and to everything but what they think may tend to the immediate advancement of the German people.

This strange blindness has seized even the intellectual classes. Can any read the apologies put forward by the German theologians and scientists without seeing that they have lost all sense of logic and all feeling for evidentiary fact? Any Canadian jury would laugh at a counsel who advanced to them an argument so full of misstatement of facts and so deficient in all intelligent reasoning.

This war is a war of aggression, a war for conquest, conceived in greed and brought forth in shamelessness—its first act a brutal invasion of a peaceful and neutral country, the attempted destruction of a free people, an act in which Prussia did not even see iniquity or aught she did not have the right to do. That it was iniquitous in the eyes of the world she saw with unfeigned amazement, not understanding that another could have any standard of international morality but her own. When it did enter her mind that neutral nations looked upon her conduct with abhorrence, her attempts to justify it would have been laughable were the subject one which admitted of light treatment—monstrous compounds, nine parts of plain lying and one of silly sophistry.

Checked with the help of British troops in her expected triumph at Paris, she has vented her hatred and brutality upon the once-happy civilian population in her power. Priest and layman, man and woman, young men and virgins, yes,

even the innocent babe in the cradle, are victims of her rage; none so old, so young, so innocent as to hope to escape the Hun. It was when about to invade China that their Emperor held up to German soldiers for their admiration and example Attila the Scourge of God, and his Huns. There was no need of such a sermon when they were invading Belgium and France; and perhaps it was because Attila had no fleet that his example was not quoted for Southampton and Hartlepool.

The destruction of innocent and neutral ships followed naturally and necessarily from the fundamental conception of right in these modern Huns.

They have threatened more such treatment when they obtain a foothold in the British Isles. If they succeed, they will be as good as their word; no sense of humanity, much less of Christianity will restrain them. Britain invaded, the British must pay the extreme penalty for that sentiment of obligation to their pledged word which induced, nay, compelled them to come to the assistance of Belgium outraged. France sorely pressed and outnumbered. Britain snatched away from the very jaws of the ruthless wolf, the prey caught and almost mastered, the wolf will not forget that disappointment, but will fully avenge it if the time comes and opportunity is toward.

We pray that the time will never come, but let us not be too confident. The splendid Fleet plies to and fro in front of German coasts; so long as that is intact a fair degree of confidence will prevail that no invasion is possible. But the arms of Germany may be successful in pushing back the forces in Belgium and the north of France. The attempt has been made more than once, and may be made again and yet again. The fortunes of war are proverbially uncertain, and it is within the realm of possibility that the attempt may be successful and that a great stretch of coast may come under the power of the enemy. The Fleet may need to be extended, the thin line may tempt the so-far intact German Fleet—and the result is in the hand of God.

It is our glory and our pride that our Canadian boys are at the front in that scene of war, where the greatest drama of all time is being played; and we hope and pray that they and their comrades may be successful, as we know that their comrades will have reason to be proud of them as they of being Britons and Canadians.

But more men and more men, and still more men, are needed. They are imperatively called for, and can we neglect that call? We Canadians are the inheritors of the glory of England, of Scotland, of Ireland; and we have our own history as well. We have been sheltered under the flag of the Old Land, and none dared make us afraid. Are we now to turn a deaf ear to the insistent call for our help? We have for a hundred years said to the Mother Country, "We shall not let thee go. Intreat me not to leave thee, or to return from following after thee: for whither thou goest, I will go; and where thou lodgest, I will lodge: thy people shall be my people, and thy God my God." This was when her care was necessary for our advancement, her protection necessary for our peace. She stood by us all through those years, and nothing was too good for her child. Now, in her hour of conflict, what is Canada to do?

There can be but the one answer—send her men, contingent after contingent, till her lines are full and can hold no more. Not one stricken field has Britain seen since Waterloo upon which Canadians have not stood and fought for the Empire. That was when there was no real danger of her destruction. From far-off Kars, where the Canadian Williams held the fort against an overwhelming mass

of assailants, to Paardeberg, won by Canadian dash and gallantry, everywhere our men fought and won. The call now, when the need is more apparent, is more urgent, cannot be disregarded.

I was told the other day by a young man of military age that it required as much courage to remain behind as to go to the front. I answered, "What a lot of very brave men there are nowadays!" I do not propose to insult the young manhood before me by supposing that here there are any who do not offer themselves for the Empire of those who are of the material from which useful soldiers can be made. Those of military age who remain behind and fail to fight for the Empire should be of two classes only, the cripple and the coward. It is sickening to see in some places, the crowds at hockey matches and the like, of hale and strong young men, whose whole life has been one of ease under the flag and who now cannot recognize their duty to fight for it.

Are there some who now say that there is no need of their joining the regiments, that the British Regular forces are sufficient to ward off all danger? The call is for men and more men, a call from those who know; and though it may be that the British forces, including Canadians already volunteered, will be sufficient to secure safety for Canada and the Empire, what part do they play, what figure do they cut, who are content to be protected by those whose call is no stronger than their own? In England it is the custom in some parts for young women to present those young men of their acquaintance who should and do not volunteer with a white feather. Is there any need of the maidens of Ontario doing that? If so, the white feather will be a burning badge of shame forever to those who wear it.

Some there are who cannot go—some are too old or too feeble. This is at least open to all who cannot go by reason of age or infirmities—they can give towards the better arming of those who do go; and all, young and old, man and woman, can help in supplying comforts for the fighter in the trenches, the sick or wounded in the hospital.

Even of those who are the stuff soldiers are made of, some must remain at home. Business must go on as usual or better; Canada must produce as much as ever, and more.

Whether with the sword and gun or with the sower and reaper, the spade and the hoe, or with any implement or in any profession, a man should work, he must decide for himself. If with a full sense of his duty to his country and his empire, without cowardly fear of wounds or death, with a careful consideration of all the circumstances of his case, he himself decides that he can do more work and better for Canada and the Empire by remaining at home, his decision must be respected. If, however, his decision is based upon the thought that by remaining at home he may make more money for himself—do more good to himself—he is as bad as a coward, he is a shirk, and will richly earn the contempt he is sure to meet—he will not be able to look in the face the returning heroes in khaki. Heaven grant that there are none such here.

Thirty-Sixth Annual Report

OF THE

# Ontario Agricultural and Experimental Union

## 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF

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1915

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TORONTO

*To His Honour* SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Agricultural and Experimental Union for 1914.

Respectfully submitted,

JAMES S. DUFF,

*Minister of Agriculture.*

Toronto, 1915.

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# Ontario Agricultural and Experimental Union

## OFFICERS FOR 1915

*President* ..... HERBERT GROH, Preston, Ontario.
*Vice-President* ..... J. B. FAIRBAIRN, R.R. No. 1, Beamsville, Ont.
*Secretary and Editor* ..... C. A. ZAVITZ, Agricultural College, Guelph.
*Assistant Secretary* ..... W. J. SQUIRRELL, Agricultural College, Guelph.
*Treasurer* ..... A. W. MASON, Agricultural College, Guelph.
*Directors* ..... DR. G. C. CREELMAN, H. L. BECKETT, R. S. DUNCAN, H. SIRETT, J. E. MCLARTY.

*Auditors* ..... S. H. GANDIER and R. R. GRAHAM.

## COMMITTEES ON CO-OPERATIVE EXPERIMENTAL WORK

*Agriculture* ..... C. A. ZAVITZ (Director), W. J. SQUIRRELL, A. W. MASON, C. R. KLINCK and A. E. WHITESIDE.
*Bee-Keeping* ..... MORLEY PETTIT (Director), GEO. F. KINGSMILL, and W. B. ANGLE.
*Forestry* ..... E. J. ZAVITZ (Director), H. A. DORRANCE, and J. LAUGHLAND.
*Agricultural Chemistry* ..... R. HARCOURT (Director), J. W. CROW, and A. L. GIBSON.
*Agricultural Botany* ..... J. E. HOWITT (Director), T. G. RAYNOR, W. J. LENNOX and HERBERT GROH.
*Horticulture* ..... J. W. CROW (Director), F. M. CLEMENT, and J. B. FAIRBAIRN.
*Schools' Division* ..... S. B. MCCREADY (Director), J. HIDDLESTON, (Secretary), J. W. CROW, J. E. BRITTON, WM. HUNT, C. A. ZAVITZ, W. R. GRAHAM, D. H. JONES, E. J. ZAVITZ, R. HARCOURT, and J. A. MCDONALD.

*Committee on the Prevention of the Importation and the Distribution of Noxious Weed Seeds in Grains and in Screenings*: G. H. CLARK (*Chairman*), R. HARCOURT, J. R. DYMOND, G. E. DAY and J. E. HOWITT.

*Committee re-appointed to make suggestions as to how the Provincial Weed Act and the Eradication of Weeds in Ontario could be made more effectual*: J. E. HOWITT (Chairman), HON. NELSON MONTEITH, W. J. LENNOX.

## TREASURER'S REPORT, 1914

| Receipts. | | Expenditures. | |
|---|---|---|---|
| Balance from last year ..... | $576 81 | Agricultural experiments .... | $1,922 47 |
| Membership fees, 424 at 50c.. | 212 00 | Schools' extension work ..... | 359 99 |
| Government grant ..... | 2,750 00 | Fertilizer experiments ..... | 85 95 |
| | | Apicultural experiments ..... | 485 21 |
| | | Botanical experiments ..... | 42 00 |
| | | Address and reporting annual meeting . . ..... | 220 50 |
| | | Meeting of Executive ..... | 10 95 |
| | | Total . . ..... | $3,127 07 |
| | | Balance on hand ..... | 411 74 |
| | $3,538 81 | | $3,538 81 |

We, the undersigned auditors, declare that we have audited the Treasurer's Accounts and found them correct.

January 1st, 1915.

Robt. R. Graham,
A. W. Mason,
*Auditors.*

# Ontario Agricultural and Experimental Union

## ANNUAL MEETING.

The thirty-sixth annual meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College, Guelph, on Monday, Tuesday and Wednesday, January 11th, 12th and 13th, 1915. The annual meeting was opened with a banquet in the new Dining Hall at the College, when about 500 officers, ex-students and students were seated at the tables. Dr. Creelman, President of the College, Hon. J. S. Duff, Minister of Agriculture, and about a dozen of the ex-students of the College gave short addresses. On Tuesday three sessions, and on Wednesday two sessions of the Experimental Union meeting were held. The day sessions convened in Massey Building, and the evening meeting in the large gymnasium. Some of the day sessions were crowded beyond the seating capacity of the hall. The reports and addresses which were presented, and the most important discussions which took place during the different sessions of the Experimental Union meeting, are embodied in this report.

## SECRETARY'S REPORT.

C. A. Zavitz, Professor of Field Husbandry, O.A.C., Guelph.

The Ontario Agricultural and Experimental Union was organized in 1879, and has now been in active operation for a period of thirty-six years. During the first six years co-operative experimental work was started with fertilizers, but in 1885 only three experimenters were continuing in the work, viz., J. R. Ramsey, J. R. Jobb, and W. H. Stubbs. A full account of the work accomplished was received from each of these three sources and was printed in the sixth annual report of the Union. In 1886 the co-operative work was started under a somewhat different plan and twelve experimenters were secured in that year. There had been a steady increase in the co-operative work from that time to the present, and we have had upwards of 5,000 Ontario farmers engaged in this work in a single year.

The co-operative work of the Experimental Union in 1914 was conducted on farms throughout Ontario in agriculture, agricultural chemistry, agricultural botany, forestry, bee-keeping, and in connection with the public schools in elementary agriculture, horticulture and forestry. The co-operative work in agriculture has been conducted for twenty-nine years, during which time there have been 76,888 distinct tests made throughout the Province. Each of these experiments consisted of from two to ten plots. The increase in the number of experimenters in agriculture can be seen from the following figures, which show the average yearly number actually engaged in the work in each of six periods of four and five years each covering the twenty-nine years during which this work has been in progress:

| Periods. | Years. | Average number of Experimenters per Annum. |
|---|---|---|
| 1886–1890 | 5 | 71 |
| 1891–1895 | 5 | 1,060 |
| 1896–1900 | 5 | 2,992 |
| 1901–1905 | 5 | 3,379 |
| 1906–1910 | 5 | 4,278 |
| 1911–1914 | 4 | 4,519 |

It is probably safe to say that the system of co-operative experiments of the Union is the most extensive which can be found in any country. There is a large amount of direct evidence to show that this co-operative work has had a very decided and wholesome influence on the agriculture of Ontario.

In 1914 there were three meetings of the Board of Control of the Experimental Union. Two of these were held in January and one in September.

About thirty thousand copies of the Annual Report of the Experimental Union were published by the Ontario Department of Agriculture in the latter part of 1914. This publication, in addition to the liberal way in which the agricultural press of the Province publish the results of the co-operative work as presented at the annual meeting, gives wide publicity by bringing the information to the homes of the farmers in Ontario.

Particular reference should be made to the farmers throughout Ontario who take so much interest and care in the co-operative work of the Experimental Union. For about 5,000 Ontario farmers to offer their services in the advancement of this work without direct remuneration shows a particularly strong desire on the part of the most progressive farmers of Ontario for the advancement of the agriculture of the Province. These various experimenters not only conduct the work to their own advantage, but also to the betterment of the Province as a whole. Besides the associates and the graduates of the College who are now farming in Ontario, a large number of leading and influential farmers of the Province who have never had an opportunity of attending an Agricultural College are doing most commendable work. The farmers who have conducted experimental work successfully on their farms in each of eight or ten years are specially trained for the work, and are now in a position to do even better work in the future than at any time in the past. The fact that Ontario has been so successful with its system of co-operative experiments in agriculture indicates more than words can express the intelligence and the ability of the farmers of this Province. The Experimental Union is an organization of active workers, and it has a peculiar field of its own. We trust that in the future this organization may prove of even greater help in the development of agriculture and in the progress of the whole country.

## PRESIDENT'S ADDRESS.

T. H. Mason, Ottawa.

Gentlemen of the Experimental Union,—Our meeting to-day is characterized by extraordinary conditions. This is the fortieth year of the College, and the thirty-sixth year of the Experimental Union, and during the whole of that period Canada has been practically at peace with the world. Now the Empire is at war, and while we in Canada are contributing men and material for the war there is another part which we must play, perhaps more essential than the other—the production of food-stuffs in larger quantities than before. With the handicaps of recent years, the wonder is that the volume of production is as great as it is, and I do not think that any agricultural community in the world will show a larger production per man than the Province of Ontario. Changing economic conditions will largely rectify the labor problem, and that very soon. We have in our Departments of Agriculture, in our Agricultural Colleges and the Experiment Stations, and in the agricultural press of the country probably as well equipped a system of agricultural education and investigation as any country in the world, and right in the van for this movement for thorough, enduring, reliable work, work than we can confidentially bank upon, I place the work that is carried on by the Experimental Department of the Ontario Agricultural College. The educative effects upon the thousands of visitors who come here during the summer months carried away and spread all over the Province, who can estimate it? What is the value of the Marquis wheat, originated by Dr. Chas. Saunders, to North America? What is the value of the O.A.C. No. 72 oats or the O.A.C. No. 21 barley to Ontario alone? What are the possibilities of Ontario Variegated Alfalfa? We have passed the day of chance selection when, perhaps, in a generation or a century we accidentally came upon a variety of surpassing merit. Now we have the work of the trained investigator, with his plant breeding, and greater progress may be obtained in a decade than formerly in a century. After the varieties are thoroughly tried out here, the cream of them is distributed over the Province from the Lakes to as far north as settlement has penetrated, to prove their adaptability to the different soils and climates of this vast Province. The time will come, and not many decades in the future, when every portion of this country that is suitable for human occupation will surely be occupied owing to the pressure of population. Here is work for the Experimental Department and the Experimental Union to originate and distribute early hardy varieties of all grasses, grains, and other food producing plants suitable for that great portion of the Province known as New Ontario. This is a field great enough to meet the ambition of any man.

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## LEWIS TOOLE—IN MEMORIAM.

The following resolution of condolence was read by Hon. Nelson Monteith, and passed unanimously:—

"In recognition of the valuable and unselfish services of the late Lewis Toole in the establishment of, and his long continued and active support of the Experimental Union, of which he was President in 1883, and again in 1914; we, the members of the Union, assembled at its Thirty-sixth Annual Convention hereby wish to place on record by resolution passed in open session our heartfelt sympathy to Mrs. Toole and the family in their great loss, and that a copy of this resolution be forwarded to Mrs. Toole."

## RESULTS OF CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

C. A. Zavitz, Professor of Field Husbandry, O.A.C., Guelph.

Once again the Committee on co-operative experiments in agriculture presents its Annual Report. As Director of this branch of the work, I am pleased to state that the co-operative experiments in agriculture throughout Ontario during the past year have met with good success. In the work of the past year I have been ably assisted by Mr. A. W. Mason, Prof. W. J. Squirrell, Mr. A. E. Whiteside, and Mr. C. R. Klinck, who, along with myself, form the Committee. The amount of work necessary in carrying on a system of co-operative experiments, the results of which are here presented, is much greater than many people imagine. The growing of the best varieties; the preparation of the seed for distribution; the printing of circulars, instruction sheets and application forms; the addressing, stamping and forwarding of printed matter; the bagging, labelling. addressing, mailing and expressing of experimental material; the answering of correspondence; the examination of the reports; the tabulation of the results; and the preparation of the reports for presentation at the meeting and for publication involve a very large amount of work. We believe, however, that this work is of an immense amount of value to the Province. It is probably one of the greatest factors in increased crop production and in agricultural education which has been introduced in the Province. It has, in co-operation with the Committee, thousands of the best farmers of Ontario, all of whom are working together for the advancement of agriculture. In 1914 there were no less than thirty-seven distinct experiments in agriculture, including spring and fall grains, root crops, forage crops, silage and hay crops, culinary crops, the growing of grains and fodder crops in different combinations, different quantities of grain per acre, and the application of commercial fertilizers and farmyard manures with winter wheat, barley, potatoes and mangels. Besides the work here referred to other special work is being conducted through the District Representatives and others in testing the influence of nitroculture and of lime with alfalfa in the selection of alfalfa and beans on different farms, etc. Most of the plots were one rod wide by two rods long, being exactly one-eightieth of an acre in size. This size of plot answers admirably as the experimenters can usually secure land for plots of this size which is quite uniform, and owing to the comparatively small size of the plots they are able to weigh the products without very much difficulty. At one time we had plots which were as large as one-half acre in size, but those proved to be very cumbersome and the results were quite unsatisfactory. With the smaller sized plots, however, the experiments can be kept more thoroughly under control and more reliable and definite results can be obtained.

The rainfall throughout Ontario was below normal in September, and was somewhat above normal in October, of 1913. In the past year April had a slightly lower mean temperature than that of the average for the same month for the past thirty-two years. The winter was fairly favorable for the autumn sown crops, but a few days of cold weather after the snow disappeared in the spring caused considerable damage to the crops in some localities. The weather conditions of the past summer have been quite favorable in most localities, although in a number of sections the crops suffered from lack of rain, and the yields in some cases are rather lower than usual. On the whole, however, we have had a good year in connection with our co-operative experimental work in agriculture.

The co-operative work in agriculture which is being carried on throughout Ontario owes its success largely to the results of experiments and investigations

obtained at the Ontario Agricultural College. The methods of operation, and the material selected for the co-operative work are based upon the College work. Close attention has been given to the methods used for the co-operative experiments, and printed instructions for conducting the tests along with blank forms on which to report the results, have been forwarded to each person undertaking the work. From the beginning the co-operative work of the Experimental Union has been controlled by circulars and letters printed and written which have been transmitted through the mails. Personal letters have frequently been sent to give encouragement and advice. The members of the Committee have not taken the responsibility of overseeing or controlling the experiments, but if special visits have been made to the experimenters the object has been to enable the directors to study the difficulties of those actually engaged in the work, and thus be in a better position to know the best methods to adopt in the printed instructions. This method places the experimenters upon their honor and tends to bring out the best that is in them. Every man is made responsible for his own experiment, and is urged to do the very best he can for himself, for his neighbors, and for agriculture as a whole. We have among the experimenters a great variety of individuals. Some are highly educated, and others are self educated. Some own large estates, and others are on rented farms. Some are school boys, others are retired farmers, but the great majority are in the prime of life. Great care is exercised in planting the various co-operative experiments in such a way that they can be successfully undertaken by the people who are to be benefited thereby. Some experiments are comparatively simple and consist of only two plots in each test, while some of the others are much more complicated and consist of ten plots. In every case, however, the work is made as clear of comprehension, as definite of purpose and as simple in method of operation as is consistent with the objects in view. It has been the aim throughout to make all experiments as interesting, as valuable and as instructive as possible.

The Experimental Union makes direct application of the information gained at the College by having experiments conducted on hundreds and even thousands of farms, and systematizes the co-operative work in such a way that the results of those experiments which have been conducted with great care and accuracy can be summarized and made into valuable reports for the guidance of farmers generally. The Experimental Union is not only a source of gain in dollars and cents to the farmers, but it is a great educational feature which has had a wholesome influence, not only on the agriculture of the Province, but upon the experimenters themselves, and on the progress of the whole country.

The following gives the list of the co-operative experiments in agriculture conducted throughout Ontario in 1914:

GRAIN CROPS.

| | Plots. |
|---|---|
| 1. Testing two varieties of Oats | 2 |
| 2*a*. Testing O. A. C. No. 21 Barley and Emmer | 2 |
| 2*b*. Testing two varieties of two-rowed Barley | 2 |
| 3. Testing two varieties of Hulless Barley | 2 |
| 4. Testing two varieties of Spring Wheat | 2 |
| 5. Testing two varieties of Buckwheat | 2 |
| 6. Testing two varieties of Field Peas | 2 |
| 7. Testing two varieties of Spring Rye | 2 |
| 8. Testing two varieties of Soy, Soja, or Japanese Beans | 2 |
| 9. Testing three varieties of Husking Corn | 3 |

ROOT CROPS.

10. Testing three varieties of Mangels ..... 3
11. Testing two varieties of Sugar Beets for feeding purposes ..... 2
12. Testing three varieties of Swedish Turnips ..... 3
13. Testing two varieties of Fall Turnips ..... 2
14. Testing two varieties of Carrots ..... 2

FORAGE, FODDER, SILAGE AND HAY CROPS.

15. Testing three varieties of Fodder and Silage Corn ..... 3
16. Testing three varieties of Millet ..... 3
17. Testing two varieties of Sorghum ..... 2
18. Testing Grass Peas and two varieties of Vetches ..... 3
19. Testing Rape, Kale and Field Cabbage ..... 3
20. Testing three varieties of Clover ..... 3
21. Testing two varieties of Alfalfa ..... 2
22. Testing four varieties of Grasses ..... 4

CULINARY CROPS.

23. Testing three varieties of Field Beans ..... 3
24. Testing two varieties of Sweet Corn ..... 2

FERTILIZER EXPERIMENTS.

25. Testing fertilizers with Potatoes ..... 6
26. Testing fertilizers with Mangels ..... 10
27. Testing fertilizers with Barley ..... 10

MISCELLANEOUS EXPERIMENTS.

28. Testing two varieties of Potatoes ..... 2
29. Testing three grain mixtures for Grain production ..... 3
30. Testing three grain mixtures for Fodder production ..... 3

AUTUMN SOWN CROPS.

31. Testing three leading varieties of Winter Wheat ..... 3
32. Testing one leading variety of Winter Rye and one of Winter Wheat.. 2
33. Testing Spring Applications of five Fertilizers with Winter Wheat .. 6
34. Testing Autumn and Spring Applications of Nitrate of Soda and Common Salt with Winter Wheat ..... 5
35. Testing Winter Emmer and Winter Barley ..... 2
36. Testing Hairy Vetches and Winter Rye as Fodder Crops ..... 2

In 1914, as in former years, each farmer who wished to experiment sent in an application for the definite experiment which he desired to carry out. In nearly all cases we were in a position to send the applicant the material for which he applied, although a few who made requests late in the season were unable to secure the varieties asked for owing to the limited supply of some of the best material.

The experimenters conducted the tests according to instructions furnished them, and reported the results of their individual experiments on blank forms which were sent along with the seed. The reports for the co-operative experiments for 1914 which have been received have been submitted to a very critical examination. For the summary which is presented at this time only the results given in those reports which were complete in all essential features and showed carefulness and reliability throughout were used. Many of these reports have been furnished by

men who have had a large amount of practical experience on the farm, have had the advantage of a good education, and have had a careful training in experimental work, as they have conducted successful tests on their own farms in each of several years past. It should be remembered that while only the good reports of carefully conducted experiments have been used for publication, many of those not included in the summary showed that the individual experimenters must have obtained a considerable amount of valuable information from their work, and in some instances a start with choice seed of varieties particularly suited to their own farms. It occasionally happens that owing to some accident an experiment may have been injured so that the results could not be used in the general summary, and yet the experiment may have furnished useful lessons to the farmer conducting it. In all cases experimenters obtain much more information from the work which they conduct than can be given in a summary report such as the one here submitted.

The instructions for conducting the co-operative work which were furnished each experimenter, contained a request for him to give his decision as to the relative standing of the different varieties, mixtures, quantities of seed, fertilizers, manures, etc., after everything had been taken into consideration. The summary of the answers to this line of enquiry is presented in the tabulated results under the heading of comparative value.

## Varieties of Grain Crops.

The Ontario Agricultural and Experimental Union conducts experiments with those classes of crops which are grown on about nine-tenths of the cultivated land of Ontario. According to the Ontario Bureau of Industries, the areas used for some of the principal crops in Ontario in 1914 were as follows: Oats, 2,776,883 acres; barley, 579,473 acres; fall wheat, 685,692 acres; spring wheat, 118,607 acres; rye, 138,913 acres; buckwheat, 177,227 acres; field peas, 177,856 acres; field beans, 51,149 acres; and corn for husking, 290,817 acres. In addition to the grains grown separately we find that in the past year there were 456,631 acres used for growing grains in combination. In most cases the grains grown in combination would be oats and barley used for grain production. Within recent years there has been a decided decrease in the areas used for spring wheat and for peas, and there has been a considerable increase in the areas used for the production of rye and of buckwheat.

After making a careful study of crop production in Ontario for more than twenty years, I am thoroughly convinced of the great importance of growing the best varieties of crops by the farmers of Ontario. With some classes of farm crops certain varieties do generally well throughout the Province as appears to be the case with the O.A.C. No. 21 barley and the O.A.C. No. 72 oats. In other cases, however, it is exceedingly important to secure the varieties which are particularly suited to the locality and to the soil. This is especially true with different varieties of corn. The best variety of corn which would give excellent results on one farm might give comparatively poor results on a farm within a very short distance. A much later variety of corn might be grown upon a warm sandy loam than on a cold clay soil. One of the greatest weaknesses in the agriculture of Ontario has been the great number of varieties of certain classes of farm crops which have been used in cultivation. This has been particularly true in the case of potatoes and of oats. It has been practically impossible for buyers to secure uniform lots of potatoes in large quantities for shipping, consequently, they have been importing potatoes from New Brunswick, and oats from the Western Provinces where more uniform samples

could be obtained in carload lots. We believe that an improvement is being made, and that within a comparatively short time a smaller number of varieties will be grown in Ontario, and much more attention will be given to those kinds which have given the best results in the trials at the Experiment Stations and in the co-operative tests throughout the Province; and that less attention will be given to new varieties which are being introduced and sold from house to house by agents who represent American seed firms. If the farmers of Ontario would confine themselves almost entirely to the growing of those varieties which have given the highest results in the experiments which have been carefully conducted in this Province great advantage would undoubtedly be obtained. We are looking forward with much hope to a considerable change in this respect in the near future. We believe that Ontario will gradually obtain a better reputation for the production of high yields of farm crops of good quality, and of a few of the best varieties which will furnish more uniform products. In bringing this about the results presented in this report will prove exceedingly helpful. We submit the tabulated results for the different varieties of grain crops believing that they should be carefully studied, and that they would form a good general guide for the Province.

| Experiments. | Varieties. | Comparative value. | Yield per Acre. | | |
|---|---|---|---|---|---|
| | | | Straw (tons.) | Grain (bus.) | Grain (lbs.) |
| Oats (141 tests) | O. A. C. No. 72 | 100 | 1.52 | 52.38 | 1,781 |
| | O. A. C. No. 3 | 73 | 1.26 | 48.96 | 1,665 |
| | Alaska | 60 | 1.26 | 43.64 | 1,484 |
| Six-rowed Barley (18 tests) | O. A. C. No. 21 | 100 | 1.20 | 35.70 | 1,714 |
| | Common Emmer | 65 | 1.15 | 28.32 | 1,359 |
| Two-rowed Barley (5 tests) | Hanna | 100 | 1.18 | 36.72 | 1,762 |
| | Two-rowed Canadian | 60 | .92 | 29.02 | 1,393 |
| Hull-less Barley (8 tests) | Black Hulless | 100 | 1.40 | 24.84 | 1,490 |
| | Guy Mayle | 91 | 1.44 | 23.17 | 1,390 |
| Spring Wheat (13 tests) | Wild Goose | 94 | 1.10 | 19.08 | 1,145 |
| | Marquis | 100 | .99 | 17.77 | 1,066 |
| Winter Wheat (9 tests) | Imperial Amber | 98 | 1.63 | 31.69 | 1,901 |
| | American Banner | 87 | 1.40 | 30.80 | 1,848 |
| | Crimean Red | 100 | 1.34 | 30.40 | 1,824 |
| | Banatka | 72 | 1.28 | 28.83 | 1,730 |
| | Yaroslaf | 80 | 1.57 | 28.27 | 1,696 |
| Spring Rye (4 tests) | O. A. C. No. 61 | 100 | 2.13 | 25.36 | 1,420 |
| | Common | 92 | 2.25 | 25.00 | 1,400 |
| Field Peas (25 tests) | Canadian Beauty | 100 | 1.07 | 21.07 | 1,264 |
| | Early Britain | 86 | .82 | 20.67 | 1,240 |
| Field Beans (7 tests) | Marrowfat | 83 | 1.08 | 24.28 | 1,457 |
| | Pearce's Improved Tree | 100 | 1.18 | 24.00 | 1,440 |
| | Common Pea | 75 | .87 | 20.15 | 1,209 |
| Soy Beans (3 tests) | Early Yellow | 100 | .49 | 30.44 | 1,826 |
| | Brown | 88 | .33 | 18.44 | 1,106 |
| | | | Whole Crop | | |
| Corn for Grain (17 tests) | Early White Cap Yellow Dent | 91 | 7.79 | 57.64 | 3.228 |
| | Salzer's North Dakota | 100 | 8.80 | 52.33 | 2,930 |
| | Early California Flint | 82 | 7.07 | 47.37 | 2,653 |

In the results here presented the yield of straw, as given in the fourth column, represents the total crop, less the amount of grain, and therefore, includes the chaff with the straw. The yield of grain is given in pounds as well as in bushels per acre in order that the results may be more clearly understood and that certain comparisons might be made between the different classes of crops as well as between the varieties of each class. Definite comparisons can be made between the varieties of each class of farm crops which were grown on the same farms. Caution should be exercised, however, in comparing one class of farm crop with another as it should be understood that these have been grown on different farms. If there were a considerable number of tests of each class, however, certain important comparisons might be made regarding the yields of different classes. Owing to the great variation in the weight per measured bushel of the different crops it is much easier to compare the results in pounds than in bushels per acre. It should be understood that in working out the number of bushels per acre the standard weights per measured bushel have been used for each class of crop. Attention is again called to the fact that the figures in the third column, under comparative value, are made up from the answers received from the experimenters in regard to the varieties after the farmers who conducted the experiments have taken everything into consideration.

*Varieties of Oats.*—Oats are grown decidedly more than any other farm crop in Ontario. The market value of the oats grown in this Province annually amounts to nearly $40,000,000. This is a large sum for one single crop, and anything which is done to increase or decrease the value of the oat crop in Ontario to the extent of one per cent. in one year would make a difference of approximately $400,000, or a change of ten per cent. would make a difference of about $4,000,000. In looking at the question from another standpoint, we learn that an increase or a decrease of one bushel of oats per acre per annum would make a difference in the value of Ontario's oat crop of approximately $1,000,000. In consideration of these facts we realize something of the value of the comparative results of the different varieties of oats successfully tested in Ontario in 1914 on one hundred and forty-one (141) separate farms.

In our instruction sheets we always ask each experimenter to sow an additional plot with the variety which has given the best results on his farm in years past. A careful examination of the returns which have been received show that in ninety-one per cent. of the experiments the O.A.C. No. 72 surpassed the varieties which the farmers selected to compare with the varieties furnished by the Experimental Union.

In our sheets of enquiry we have asked each experimenter to name the variety of oats which is grown the most extensively in his own county. The answers to this question give us some interesting information in regard to the varieties of oats in extensive cultivation throughout the Province. In summarizing these answers for 1914 it was found that the most extensively grown varieties of oats were the following, and in the order here given: American Banner, Siberian, Twentieth Century, Ligowa, Irish White, and Sensation. The Banner was grown more extensively than the Siberian, and these two varieties together were apparently grown on about seventy per cent. of the oat land of the Province. In each of the four years previous to 1914 the reports indicated that the three most extensively grown varieties in Ontario were the Banner, the Siberian, and the Ligowa. In 1914 the Ligowa dropped one place, and the Twentieth Century came third in the list. The full number of varieties mentioned as being extensively grown were 29

in 1911, 33 in 1912, 31 in 1913, and 26 in 1914. We hope in 1915 the number will be reduced to even a greater extent. There are still too many different varieties of oats grown in Ontario. We believe that two or three of the best general crop varieties, and one or two of the best early kinds would give far better results throughout Ontario than the large number of kinds which have been grown in past years.

In the spring of 1914 three varieties of oats were used for the co-operative tests, viz., the O.A.C. No. 72, the O.A.C. No. 3, and the Alaska. These had all been distributed and grown in Ontario previously. The aim of the Experimental Union is to introduce as few varieties as possible and only use in the co-operative work those which have proven to be highly worthy, as indicated by the results of the experiments at the Provincial Experiment Station at Guelph.

The tabulated report shows that there were 141 complete and carefully conducted experiments with oats throughout Ontario in 1914. This number was not quite as large as in 1913, but is considerably above the average. It will be seen that the O.A.C. No. 72 variety has again made a high record throughout Ontario. Its yield throughout the Province in the past season has been over fifty-two bushels of grain per acre, and the variety was very popular with the experimenters. In 1913, the O.A.C. No. 72 surpassed the next highest yielding variety by 8.8 bushels per acre. The O.A.C. No. 72 has now been distributed throughout Ontario in each of three years, viz., 1911, 1913, and 1914, and has headed the list in average yields in each of the years in which it has been distributed.

The O.A.C. No. 72 variety of oats was started at our Agricultural College in 1903 from a single plant. It produces a straw of good length and of good quality, usually standing up better than most other varieties. The head is spreading in its habit of growth, and the chaff has a pinkish appearance. The grain is fairly long, somewhat open in the bosom, of a pinkish white color, and usually weighs fully the standard weight per measured bushel. The quality of the grain is good, the percentage of hull being only about 27 per cent., which is about 3 per cent. less than that of the average of the different varieties of oats. It is one of the very thinnest in the hull of the late maturing varieties. In the co-operative experiments over Ontario in 1914 the O.A.C. No. 72 proved particularly strong in the straw, surpassing the other varieties under experiment in this respect. It is probably safe to say that the O.A.C. No. 72 variety of oats will be worth millions of dollars to the Province of Ontario, and that it will soon supplant nearly all other varieties. At the Provincial Winter Fair held at Guelph in December last there were more entries of the O.A.C. No. 72 oats than of any other variety.

The second place in yield per acre in 1914 is occupied by the O.A.C. No. 3 variety. This was distributed in 1913 for the first time when it also occupied second place in yield per acre, being surpassed only by the O.A.C. No. 72. In 1913 it surpassed the Alaska and the Daubeney varieties, and in 1914 the Alaska variety. The Daubeney oats were not distributed last spring. The O.A.C. No. 3 is an exceptionally early maturing variety of oats. It matures about ten days earlier than either the Banner or the O.A.C. No. 72. It also has a spreading head and a comparatively stiff straw, for an early oat. The chaff is white, and the grain is white, rather slender, comparatively small in size, and exceedingly thin in the hull. The O.A.C. No. 3 is actually thinner in the hull than any one of about three hundred named varieties which have been under experiment at the College. This variety is exceptionally suitable for mixing with barley where it is desirable to grow the two grains in combination for grain production.

The Alaska variety of oats has been recognized as one of the best early

varieties. It was surpassed, however, in each of the past two years by the O.A.C. No. 3, which is a thinner hulled variety and one which is likely to take the place of both the Alaska and the Daubeney in general cultivation throughout Ontario, where a very early oat is desired which is also a large yielder of grain of superior quality.

*O.A.C. No. 21 Barley and Common Emmer.* Barley is an important crop in Ontario. Those Counties which produced upwards of 25,000 acres of barley in Ontario in 1914 were as follows: Simcoe, 63,152 acres; York, 41,498 acres; Huron, 30,053 acres; Grey, 28,634 acres; Peel, 27,007 acres; and Perth, 25,694 acres. The total area of barley in the Province in the past year was 579,473 acres, and the average yield per acre was 31.2 bushels, which is 3.3 bushels per acre more than the average for the past thirty-three years. Over eighteen million (18,000,000) bushels of barley were produced in Ontario in the past year.

In the co-operative experiments in 1914 the O.A.C. No. 21 barley was distributed throughout Ontario for a comparative test with the Common Emmer. The results show that in the average of successfully conducted tests in eighteen different localities the O.A.C. No. 21 barley took the lead, with an average of 35.7 bushels per acre. This barley was originated at the College, and was started from a single seed in 1903. It possesses a comparatively stiff straw of good length. The heads are six-rowed, fairly compact, and of good size. The grain usually surpasses the standard in weight per measured bushel, and is of good quality. The kernels are of medium size, and of a bluish color under the hull. The variety yields heavily and has become very popular throughout Ontario. According to enquiries made in the past year the indications are that the Mandscheuri and the O.A.C. No. 21 varieties are the most extensively grown in fully 90 per cent. of the different localities of Ontario. From other evidence furnished it appears that from 90 to 96 per cent. of all the barley grown in the Province is either of the Mandscheuri or the O.A.C. No. 21 varieties. Both of these were introduced by the College. After being tested in the experimental grounds, they were distributed through the medium of the Experimental Union, and the thousands of acres which are now grown were started by the farmers from the small lots obtained for the trial plots. At the Provincial Winter Fair held in Guelph last month the eighteen entries in the open class of six-rowed barley were all O.A.C. No. 21 with two exceptions, one of these being the Mandscheuri. In connection with the Field Crop Grain Exhibit at the Provincial Winter Fair there were in all twelve entries of barley, all of which were the O.A.C. No. 21. This barley is taking a very prominent place in crop production in Ontario. We know of no other variety in the Province equal to the O.A.C. No. 21, which is probably grown more extensively than all varieties combined, even including the Mandscheuri.

*Two-rowed Barley.*—There is only a very limited amount of two-rowed barley grown in Ontario. This has been the principal barley grown in some of the European countries, but in this Province its yield has been comparatively light. A number of varieties have been tested at the College, and although a few of the very best have been distributed in Ontario they have exerted but little influence in the Province, and it is probably safe to say that unless some better varieties of two-rowed barleys can be found our attention will be directed almost entirely to the six-rowed varieties. In the co-operative experiments throughout Ontario for 1914, of which we have five good reports, we find that the Hanna two-rowed barley did exceptionally well this year, yielding even a little more than the O.A.C. No. 21. This, however, is very exceptional. We find that in a series of years the O.A.C. No. 21 considerably surpassed any variety of two-rowed barley which we have grown.

*Hulless Barley.*—The hulless barley has also been grown only to a limited extent in Ontario, although a few years ago when the pea weevils were so prevalent in south-western Ontario the hulless barley was used to take the place of the pea crop to a considerable extent. The area at present, however, is quite limited. The Guy Mayle has given good results at Guelph. In the co-operative experiments, throughout Ontario, however, the Black hulless surpassed the Guy Mayle by an average of fully one and one-half bushels per acre. The strength of straw of the Guy Mayle proved to be somewhat better than that of the Black Hulless variety.

*Spring Wheat.*—The average area of spring wheat in Ontario for the past thirty-three years has been 344,000 acres, and the area devoted to this crop in 1914 was only 118,607 acres. In 1913 the Marquis variety, which was originated by Dr. Wm. Saunders and selected and introduced by his son, Dr. C. E. Saunders, of the Central Experimental Farm, Ottawa, surpassed the Wild Goose in yield per acre by an average of exactly one-half bushel per acre. In 1914, however, the Wild Goose surpassed the Marquis by an average of a little over one bushel per acre. The Marquis variety is giving good results in the Western Provinces, and is a grain of good quality.

*Winter Wheat.*—The results of both the College experiments and of the co-operative tests with winter crops, were published in leaflet form, and the information was sent to about three hundred and fifty newspapers in Ontario between the time of harvest and of seeding last autumn. A copy of this report was also sent to each of the experimenters throughout Ontario. The Imperial Amber occupied highest place in yield per acre. The American Banner, which closely resembles the Dawson's Golden Chaff, occupied second place. Particular attention is drawn to the Crimean Red which was a popular variety in Ontario, gave a good yield per acre, and is a superior wheat for bread production. Unfortunately, the Crimean Red is much weaker in the straw than the varieties of the Dawson's Golden Chaff or the American Banner type.

*Spring Rye.*—In 1914, as in 1913, and also in 1912, the O.A.C. No. 61 spring rye has given the highest yield of grain per acre. Of all the varieties of spring rye which we have grown, the O.A.C. No. 61 has given the best satisfaction both in the experiments at Guelph, and in the co-operative experiments throughout Ontario.

*Field Peas.*—The average yield of field peas, according to the Ontario Bureau of Industries, was 14.7 bushels per acre in 1914. An average result of 21 bushels per acre for the Canadian Beauty variety, grown on twenty-five Ontario farms, shows that this pea has made a very fair record. The last three or four seasons have been particularly unfavorable for pea growing in this Province. We hope with the introduction of improved varieties, and the appearance of more suitable seasons, that the tendency will be to increase the area used for this important crop in Ontario.

*Field Beans.*—Although the Marrowfat variety occupies first place in yield of field beans per acre, particular attention should be drawn to the Pearce's Improved Tree variety which gave an average yield of only 17 pounds per acre less than the Marrowfat in the results for 1914. The Pearce's Improved Tree bean was distributed in 1913 for the first time, and in that year it surpassed the Marrowfat in yield of grain per acre by 66 pounds in the average of twenty tests. The Common Pea bean, fresh seed of which was obtained from Kent County in each of the past two years, occupied lowest place in yield per acre in 1914, and in 1913. The Pearce's Improved Tree bean produced plants of an average of 14 inches in height in the past season, while those of the Marrowfat were 15 inches,

and those of the Common pea bean were 10 inches high. The Pearce's Improved Tree beans are white in color, of medium size, and have proven to be very prolific and of excellent quality in the experiments at the College.

*Soy Beans.*—Only three successfully conducted tests with soy beans were made in connection with the Union in 1914. The Early Yellow variety has surpassed the Brown variety by 12 bushels per acre. The Early Yellow soy bean has proven to be one of the very best varieties which has been tested at the College, and an average of 30 bushels per acre is certainly a fine yield.

*Winter Rye.*—In the autumn of 1913 the Mammoth White winter rye and the Imperial Amber winter wheat were distributed to be tested under uniform conditions. The average results show that the Imperial Amber winter wheat surpassed the Mammoth White winter rye by a yield of 83.2 pounds of grain per acre. In experiments throughout Ontario for seven years the Mammoth White surpassed the Common variety of winter rye by an annual average of practically four bushels per acre.

*Winter Emmer and Winter Barley.*—A comparative test of winter emmer and winter barley has been made throughout Ontario in each of the past five years. The average results for the three years previous to 1913 showed that the winter emmer gave 1,830 and the winter barley 1,812 pounds of grain per acre. The average results of an experiment conducted on two farms in 1914 showed that the winter barley gave 1,480 pounds, and the winter emmer 720 pounds per acre. The winter emmer was quite badly winter killed.

*Buckwheat.*—Three varieties of buckwheat were distributed in the spring of 1914, but no reports of successfully conducted experiments were received. Within the past few years the Rye buckwheat which is grown considerably in Nova Scotia, has been tested at the College and throughout Ontario. It has given a decidedly larger yield per acre than any other variety in the average results of both the College and the co-operative experiments.

*Corn for Grain Production.*—No one variety of corn is suitable for general cultivation in Ontario. It is of particular importance that co-operative experiments be conducted in order to enable the experimenters to glean information regarding the most suitable corn for their own particular soil and locality. In the spring of 1914 seed of three varieties of corn was distributed for grain production. The average results of seventeen successfully conducted experiments show that the Early White Cap Yellow Dent surpassed the Salzer's North Dakota, and the Early California Flint in yield of grain per acre. In the co-operative experiments, however, the Salzer's North Dakota was slightly more popular with the experimenters than the Early White Cap Yellow Dent. According to the reports of the experimenters the average height to which the crop of each variety grew in the past year was as follows: Early White Cap Yellow Dent, 87 inches; Salzer's North Dakota, 78 inches; and Early California Flint, 70 inches. Each of these varieties did particularly well in the localities and on the soils to which they were the best suited.

## Grains Grown in Combination for Grain Production.

A large amount of systematic experimental work has been conducted at the Agricultural College with various combinations of grain for the production of grain. The results have been both interesting and important. It has been found that certain combinations gave practically no advantage, while others furnished considerable increases in crop production. Different varieties of the same class of

grain have shown but little, if any, increase in yield per acre. Combinations of certain classes, however, have shown decided advantages. One of the most striking results obtained is the fact that oats and barley grown together in the proper proportions and of the right varieties have given a yield of fully two hundred pounds of grain per acre per annum over either grain grown separately. Varying proportions of oats and barley have been carefully tested in the Experimental Department at the College. Based on these results co-operative experiments have been arranged for Ontario.

From 1905 to 1909 an experiment was conducted with different varieties of oats, barley and spring wheat which were grown in combinations of two and three kinds of grain together. The results of the five years' experiments showed that throughout Ontario one bushel of the Daubeney oats and one bushel of the Mandscheuri barley gave a higher yield of grain per acre than any of the other mixtures used in this experiment. In 1910 a co-operative experiment was conducted for the first time throughout Ontario in testing three different proportions of oats and barley in order to find out which one would give the largest yields on the average and on the different soils throughout the Province. In 1910 the varieties used were the Daubeney oats and the Mandscheuri barley; in 1911, the Alaska oats and the O.A.C. No. 21 barley; in 1912, in 1913, and in 1914, the Daubeney oats and the O.A.C. No. 21 barley.

The results of the experiments in 1912 were not of sufficient value to be reported in tabulated form. The average results of the experiments in each of the other four years are as follows:

| Varieties and Combinations. | Seed per Acre. | | | Yield per Acre. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Tons of Straw. | | | | | Pounds of Grain. | | | | |
| | Bushels. | Pounds. | | 1910. | 1911. | 1913. | 1914. | Average. | 1910. | 1911. | 1913. | 1914. | Average. |
| Oats..... | ½ | 17 | 41 | 1.32 | .75 | .97 | .68 | .93 | 1,528 | 1,420 | 1,260 | 1,136 | 1,336 |
| Barley.... | ½ | 24 | | | | | | | | | | | |
| Oats..... | 1 | 34 | 82 | 1.47 | .93 | 1.25 | .68 | 1.08 | 2,104 | 1,820 | 1,510 | 1,296 | 1,683 |
| Barley.... | 1 | 48 | | | | | | | | | | | |
| Oats..... | 1½ | 51 | 123 | 1.61 | 1.29 | 1.63 | .65 | 1.30 | 2.096 | 1.594 | 1.700 | 1,488 | 1,720 |
| Barley.... | 1½ | 72 | | | | | | | | | | | |

The average results show that a mixture of one and one-half bushels of oats and one and one-half bushels of barley, or a total of three bushels per acre, has given the highest average yield in grain production. A study of the tabulated results show that in only two years did this combination stand the highest. In 1910 and in 1911 a mixture consisting of one bushel of each kind of grain proved to be the most productive. In the results of more extensive experiments carried on at the Agricultural College, extending over a period of more than ten years, the combination of one bushel of oats and one bushel of barley has produced the largest yield of grain. The seasons of 1913 and of 1914 being comparatively dry seemed to favor the heavier seeding. It will be interesting to observe the results of this experiment over a longer period of time.

## Field Roots, Fodder Crops, Grasses, Clovers and Alfalfa.

Co-operative experiments were conducted throughout Ontario in 1914 with mangels, sugar beets for feeding purposes, swede turnips, fall turnips, field carrots, fodder corn, millet, grass peas, vetches, rape, kale, field cabbage, grasses, clovers and alfalfa. For some of these crops there were only a few applications and in a few instances the results obtained are very meagre. In the majority of tests, however, we received a sufficient number to enable us to present results which are valuable as a general guide in regard to the different varieties as grown throughout the Province. We always find it difficult to get full reports of grasses, clovers and alfalfa in a way to present in the form of a table. These different crops are not ready for cutting at the same time, and the weather conditions sometimes make it very difficult, indeed, to give uniform weights of either the green crops or of the hay. Some of the crops produce one, some two, and some three cuttings in the one season, hence, the difficulty in presenting definite information. The following table gives in tabulated form the average results of some of the experiments here referred to:

| Experiments. | Varieties. | Comparative Value. | Yield per acre (tons). |
|---|---|---|---|
| Mangels (8 tests) | Yellow Leviathan (Ferry) | 94 | 27.07 |
| | Ideal (Ontario Seed Co.) | 100 | 26.13 |
| | Sutton's Mammoth Long Red | 93 | 26.12 |
| Sugar Beets (6 tests) | Bruce's Giant White Feeding | 100 | 24.82 |
| | Rennie's Tankard Cream | 95 | 24.12 |
| Swede Turnips (3 tests) | American Purple Top | 100 | 17.99 |
| | Bruce's Giant King | 100 | 17.67 |
| | Garton's Model | 72 | 15.56 |
| Fall Turnips (2 tests) | Sutton's Imperial Green Globe | 100 | 27.77 |
| | Red Top White Globe | 92 | 26.95 |
| Carrots (7 tests) | Bruce's Mammoth Intermediate Smooth White | 100 | 18.72 |
| | Steele, Briggs' Improved Short White | 90 | 16.75 |
| Fodder Corn (4 tests) | Late White Cap Yellow Dent | 100 | 14.17 |
| | Wisconsin No. 7 | 90 | 12.72 |
| | Early White Cap Yellow Dent | 88 | 12.00 |
| Grass Peas and Vetches (2 tests) | Hairy Vetches | 100 | 7.70 |
| | Grass Peas | 82 | 5.70 |
| | Common Vetches | 64 | 5.12 |
| Hairy Vetches and Winter Rye (4 tests) | Common Winter Rye | 100 | 11.32 |
| | Hairy Vetches | 62 | 4.88 |
| Millet (3 tests) | Japanese Panicle | 100 | 8.70 |
| | O.A.C. No. 71 | 100 | 7.23 |
| | Hungarian Grass | 72 | 6.09 |
| Rape, Kale and Cabbage (2 tests) | Sutton's Earliest Drumhead Cabbage | 100 | 20.62 |
| | Thousand Headed Kale | 83 | 14.99 |
| | Dwarf Essex Rape | 71 | 10.81 |

*Mangels.*—Different varieties of each of four distinct types of mangels have been under experiment at the College, viz., the long, the intermediate, the globe, and the tankard. At one time it was thought that the long red mangel was the most prolific in root production. Within recent years, however, in most of the experiments at the College and throughout Ontario, the highest yielding varieties of the long red type have been surpassed by the leading varieties of the intermediate and the tankard type. The globe varieties are nearly always low yielders.

In 1914, three varieties of mangels were distributed for co-operative experiments throughout Ontario. These represented the long, the intermediate and the tankard classes. The Yellow Leviathan again heads the list in yield of roots per acre. This belongs to the intermediate type, and is now offered for sale by a number of the Ontario seedsmen. The seed of the Yellow Leviathan mangel was first obtained by the Ontario Agricultural College from D. M. Ferry & Co., Windsor, Ontario, in the spring of 1893. The name "Yellow Leviathan" was entered in the catalogues of some of the seedsmen as follows: The Steele, Briggs Seed Co., Toronto, in 1896; Jas. Hewer, Guelph, in 1908; the Wm. Rennie Seed Co., Toronto, J. A. Simmers, Toronto, and Jno. A. Bruce, Hamilton, in 1909; and Geo. Keith, Toronto, in 1910. We have found that the seed under the name of Yellow Leviathan obtained from the different seedsmen in Ontario has varied considerably in germinating power of the seed, and in shape, size, and color of the roots.

*Sugar Beets for Feeding Purposes.*—The so-called sugar beets, or, more properly speaking, sugar mangels, are grown in Ontario for feed production. This class of root is quite distinct from the sugar beets grown for sugar production. As a rule mangels have from 5 to 8 per cent. of sugar, sugar mangels from 8 to 11 per cent. of sugar, and sugar beets from 14 to 16 per cent. of sugar. The sugar mangels grow largely out of the ground, and are more easily harvested than the sugar beets which are produced for sugar production. For co-operative work in Ontario two varieties of sugar mangels have been selected from a large number of different varieties which have been under experiment at Guelph, and these two were distributed in the spring of the present year. The Bruce's Giant White Feeding surpassed the Rennie's Tankard Cream by about two-thirds of a ton per acre in the average of the experiments conducted on six Ontario farms in 1914. In 1913 the average results were in the same comparative order. In 1912, the two varieties used were the Rennie's Tankard Cream and the Steele, Briggs' Royal Giant, the former surpassing the latter by about two tons of roots per acre.

*Swede Turnips.*—Although the acreage devoted to swede turnips in Ontario has been gradually decreasing there is still a greater area devoted to this class than to any other class of field roots in the Province. Of the three varieties distributed in the co-operative experiments in 1914, the American Purple Top heads the list with an average of practically 18 tons per acre. The Garton's Model occupies lowest place with an average of 2½ tons per acre less than the American Purple Top.

*Fall Turnips.*—In 1914, as in 1912, the Sutton's Imperial Green Globe surpassed the Red Top White Globe in average yield of roots per acre. The fall turnips are not extensively grown in Ontario, but usually yield well. Owing, however, to the fact that the roots will not keep late into the winter, the fall turnips will not likely become very generally grown in the Province.

*Field Carrots.*—The Intermediate White field carrots are now extensively grown in Ontario. They yield much better than the White Belgian variety, which was grown quite extensively in the Province in former years. Of the two varieties of the Intermediate White carrot sent out in the spring of 1914, the Bruce's Mammoth Intermediate Smooth White surpassed the Steele, Briggs' Improved Short

White by an average of practically two tons per acre, according to the reports received from seven experimenters who tested the comparative merits of these two roots.

*Fodder Corn.*—The area used for fodder corn throughout Ontario is increasing from year to year. This is an exceedingly valuable crop, and its cultivation should be encouraged. It is important, however, to secure those varieties which will give the best returns on the particular soils on which the corn is to be grown. The yield of total crop per acre is only one point of consideration. Quality and maturity are also important factors. When a certain variety of corn is grown on the same farm for a number of years, and where the grower selects his own seed from year to year, he is likely to change the type, the yield and the maturity of the corn to a certain extent. We, therefore, observe that where one variety is grown by a number of farmers, who select the seed according to their own ideals, different strains are gradually developed. The White Cap Yellow Dent corn has been a popular variety in Ontario for some years past. Some farmers wishing to secure this good variety have obtained seed which on some occasions has given satisfactory results, and on others has produced results which have been somewhat disappointing. This is owing undoubtedly to the fact that this corn is now composed of a number of strains which vary considerably. In selecting the seed in 1913 and in 1914 the Experimental Union used an early and a late strain of the White Cap Yellow Dent, and also the variety known as Wisconsin No. 7. In the results of each of the past two years the Late White Cap Yellow Dent gave the largest yield, and the Early White Cap Yellow Dent the lowest yield, the Wisconsin No. 7 occupying an intermediate place in each of the two years. It will, therefore, be seen that not only is it important to secure a good variety of corn, but it is also important to know the source of the seed and to have as complete a knowledge as possible as to the particular strain of corn which is obtained, especially if the variety of corn has been grown by farmers over a considerable period of time.

*Grass Peas and Vetches.*—For sixteen years in succession experiments have been conducted throughout Ontario in the testing of grass peas, hairy vetches, and common vetches. It has enabled the farmers to glean valuable information regarding these three leguminous crops, and in reference to which a considerable amount has been written in recent years, especially in connection with the hairy vetches. The grass peas have been grown in Ontario as a farm crop, the common vetches for mixing with oats as a green fodder, and the hairy vetches as a fodder crop, as a cover crop for orchards, and as a crop for mixing with oats and clover for the production of a pasture.

In 1914, the hairy vetches gave a yield of 7.7 tons of green crop per acre in the co-operative experiments. This variety was also more popular than either the grass peas or the common vetches. In the co-operative experiments over Ontario the greatest yield of fodder per acre of these three leguminous crops was produced by the hairy vetches in 1899, 1900, 1901, 1902, 1906, 1907, 1908, 1909, 1911, 1913, and 1914. In nearly every year the common vetches have occupied lowest place in yield of fodder per acre. The seed of the hairy vetches has been expensive, although it is being grown more and more in some of the southern parts of Ontario, especially in Norfolk County, where it is frequently sown in the autumn with winter rye, and the two crops are harvested together for seed.

*Millet.*—When the spring is late in opening up, and when there is likely to be a deficiency of hay, millet forms a valuable crop in Ontario. It is used rather more as a catch crop than it is in the regular rotation. About thirty varieties have been tested at Guelph. The Japanese Panicle has proven to be a very productive

variety of green fodder or of hay. It is, however, more difficult to grow seed of the Japanese Panicle than of some of the other varieties, and consequently seed is usually scarce and of a high price. In the co-operative experiments over Ontario in 1914 the Japanese Panicle millet gave an average yield of nearly three tons per acre more than the Hungarian Grass.

*Rape, Kale and Field Cabbage.*—In the experiments at Guelph, where twenty varieties of rape, kale, field cabbage, etc., have been grown under uniform conditions, it has been found that the field cabbage has made high records, surpassing the different varieties of rape by several tons of green crop per acre. In each of the past few years the Dwarf Essex Rape, Thousand Headed Kale, and Sutton's Earliest Drumhead Cabbage have been used for the co-operative experiments. The yields, especially of the cabbage, have usually been high. It is interesting to note in the results for the past year that the Sutton's Earliest Drumhead Cabbage has given an average of 20.6 tons per acre, and the Dwarf Essex Rape 10.8 tons per acre, the cabbage surpassing the rape by nearly ten tons. The field cabbage makes a low thick growth, and usually yields heavier than its appearance would indicate. The seed of this crop has been sown in rows, and the cabbage has been treated in exactly the same way as the rape. There has consequently been a growth of leaf rather than of head of the cabbage. In the-feeding experiments conducted at the college the rape and the cabbage have been about equal for feeding purposes.

*Grasses.*—We find it exceedingly difficult to get accurate returns from experiments with grasses as they are not all of the same degree of hardiness, and are ready for cutting at different times in the season. Some produce a much greater aftergrowth than others. The co-operative experiments, however, enable the farmers to glean some very excellent information regarding the characteristics of the different varieties and their suitability for the particular soil on which they are grown. Tall Oat, Orchard Grass, Meadow Fescue and Timothy have been distributed throughout Ontario for co-operative experiments in each of several years. The Tall Oat and the Orchard Grass have each given an early growth of crop in the spring. The Tall Oat has usually been a higher producer of hay, and at the college has given more pasture than any other variety of grass. The three named varieties are very hardy and are some of the most important grasses to be used in a permanent pasture mixture.

*Clovers.*—The remarks made in reference to the difficulty in securing definite information from the experiments with grasses will also apply equally well regarding clovers. In each of several years past the seed of Red Clover, Alsike Clover and Mammoth Red Clover has been distributed for co-operative experiments throughout Ontario. The Mammoth Red Clover has usually produced the highest yield in the first cutting, but when the total crop in each season has been taken into consideration there has not been much difference in amount of hay per acre from the Common Red and the Mammoth Red varieties.

*Alfalfa.*—Tests have been made at the college with alfalfa seed obtained from many sources, and some excellent object lessons have been obtained. It has been found that the variegated alfalfas such as the Grimm, the Ontario variegated and the Baltic, are very much more hardy than the common variety. The common variety possesses flowers which are violet in color, the coloring matter appearing in different degrees of density, extending from a comparatively deep to a very pale violet, the latter being almost white. The Variegated alfalfa produces flowers which are variegated in color, and besides the violet include shades of blue, green and yellow, and various blends of these with each other and with violet. The Ontario Variegated alfalfa has been grown in the Province of Ontario for the past forty-

four years, and the Grimm alfalfa in Minnesota for about fifty-seven years. This continuous growth in a cold climate has caused the tender plants to disappear to such an extent that the strain has become decidedly more hardy than the alfalfa produced from seed obtained from a warmer climate where it has been grown for many years, and which still contains a large proportion of tender plants.

In order to allow farmers to ascertain for themselves whether or not the hardy varieties will prove suitable to their own conditions of soil and climate, two kinds are distributed through the medium of the Experimental Union each year. We find that alfalfa can be grown successfully in some parts of practically all the counties of Ontario, providing care is taken to select a hardy variety, to inoculate the seed, to sow the seed after corn, potatoes, roots or summer fallow, and on land which is well underdrained, either naturally or artificially. The sowing of alfalfa as a hay crop may be performed according to any one of the following methods:

1. Alfalfa seed may be sown on winter wheat in the early spring either on the old snow or on a fresh snow of one or two inches, and no harrowing or cultivation is necessary.

2. On a suitable seed bed and as soon as the land is sufficiently dry in the spring, alfalfa seed may be sown from the grass seed box placed in front of the tube drill. About one bushel of barley, wheat or rye per acre sown from the tubes of the drill makes a very good nurse crop. After the seed is sown the land should be harrowed lightly.

3. Alfalfa may be sown alone in the month of July on a summer fallow, providing there is sufficient moisture for good germination.

In the spring of 1913 the Grimm alfalfa was distributed in twenty pound lots to each of twenty of County Representatives in Ontario. The experiment was conducted on an acre plot in each county. The acre was divided into four sections. One-quarter of an acre received pure alfalfa seed, another section received seed which had been inoculated, another section received lime, and the fourth section received both inoculated seed and lime. This experiment should bring out some good results, and we have already received reports of the Grimm alfalfa coming through the past winter successfully, while fields which were sown with seed obtained through the seed trade were badly winter killed

In the spring of 1914 seed of the Grimm alfalfa was sent to fourteen District Representatives, with the object of seed production, and the following instructions were sent to each experimenter:

1. At least forty rods from any alfalfa field, select three acres of uniform land which has a good natural underdrainage, and preferably soil of rather a heavy character, elevated and sloping.

2. The land should be summer fallowed thoroughly until July.

3. After a nice rain in July, and as soon as the land can be worked on the surface to good advantage, the seed should be sown.

4. The three acres should be divided into six equal parts, thus making six plots of one-half acre each, and the sowing should be done as follows:

Plot No. 1—Broadcast, 6 lbs. (12 lbs. per acre).
" 2—Rows about 30 inches apart, 3 lbs. (6 lbs. per acre).
" 3—Rows about 30 inches apart, 2 lbs. (4 lbs. per acre).
" 4—Rows about 30 inches apart, 1½ lbs. (3 lbs. per acre).
" 5—Rows about 30 inches apart, 1 lb (2 lbs. per acre).
" 6—Rows about 30 inches apart, ½ lb. (1 lb. per acre).

For sowing the rows a turnip drill, or a Planet Junior drill would answer the purpose.

5. Cultivation should take place between the rows in the autumn of the present year, and in the spring, and after each crop is cut in each year following in which the alfalfa grows satisfactorily.

6. The cultivation throughout should be conducted with the object of producing a large yield of seed of good quality. For seed production the cultivated row system requires less seed, favors a larger seed production, conserves soil moisture, kills the weeds, destroys grasshopper eggs, etc.

This co-operative experiment should be one of the most important ever conducted with alfalfa throughout Ontario.

*Varieties of Sweet Corn for Table Use.*—Sweet corn is grown in Ontario for table use at home, for supplying the canning factories, and for using as a green or a dry fodder for farm stock. For home use it is important to secure those varieties which are ready for use at different dates, and which produce corn of the highest quality for table use. For factory use it is important to have good sized ears of white corn, and of good flavor. For feeding purposes it is important to have varieties which produce a large amount of stalks and of ears most suitable for feeding in the autumn to farm stock. The main object in the co-operative experiment with Sweet Corn has been to secure the variety for table use at home that will furnish the grain which is sweet, juicy and tender, and ears which are comparatively small and have but few rows, eight being the most desirable number. Fully fifty varieties of sweet corn have been under test at the Ontario Agricultural College These different varieties have all been studied in the field, and many of them have been tested for table use. In each of several years three varieties were distributed to farmers throughout Ontario so that they could ascertain for themselves which one of the three would prove the most serviceable for their private use. The varieties which were used most extensively were the Golden Bantam, the Mammoth White Cory, and the Malakhoff. Of these varieties the Golden Bantam proved the best, the Mammoth White Cory second best, and the Malakhoff came lowest in the list. In 1913, and again in 1914, only two varieties were selected for distribution, one being the kind which has proven most desirable as an early corn, and the other being a standard late variety. The two kinds used were the Golden Bantam of the early, and the Stowell's Evergreen of the late varieties. The following table gives the average results of thirty-eight successfully conducted tests with these two varieties under similar conditions in the past year:—

| Experiment. | Varieties. | Comparative Value. | Number of Ears. | Number of days until ready for table use. | Table quality. | |
|---|---|---|---|---|---|---|
| | | | | | Flavor. | Juiciness, |
| Sweet Corn (38 tests) | Golden Bantam.... | 100 | 149 | 89 | 100 | 100 |
| | Stowell's Evergreen | 83 | 128 | 102 | 80 | 84 |

The results for 1914 show, as in 1913, that the Golden Bantam surpassed the Stowell's Evergreen in popularity, in number of ears, in flavor and in juiciness. In 1913, the Golden Bantam was on the average ready for use 13 days, and in 1914, 15 days earlier than the Stowell's Evergreen. For home use the Golden Bantam can be planted at different dates, so as to give a longer season of usefulness, or the Golden Bantam and the Stowell's Evergreen can be planted at the same time and thus secure a lengthened period in which the corn is available for table use.

The Golden Bantam, which is a most delicious table corn, is increasing in its growth throughout Ontario, and we believe as time advances its cultivation will become more general. This corn might be grown with but little difficulty in practically all of the farm gardens throughout the Province.

### Varieties of Potatoes.

There were 26,717,587 bushels of potatoes produced in Ontario in 1914. This was fully seven million bushels more than in 1913, and eight million bushels more than the average of the past thirty-three years. The four counties of Ontario which produced the largest yields of potatoes in the past year were Simcoe, Middlesex, York and Grey.

In 1914, an enquiry was made from the various experiments regarding the most extensively grown varieties of potatoes in the various counties of Ontario. In all, 51 varieties were mentioned one or more times as being the most extensively grown in the different counties. As the result of a similar enquiry, 57 varieties were mentioned in 1913, and 58 varieties in 1912. It is to be hoped that the number of varieties is gradually decreasing in the Province, and that within a comparatively short time the farmers will confine themselves largely to a few of the highest yielding varieties of the best quality. The following gives the names, and the order of the varieties which were mentioned the greatest number of times in 1914: Rural New Yorker No. 2, 32; Delaware, 25; Carman, 19; Empire State and Irish Cobbler, each 16; Early Rose, 14; White Elephant, 13; Extra Early Eureka, 9; American Wonder, 8; Green Mountain, 7; Beauty of Hebron, 7; Carman No. 1, 6; and Dooley and Early Ohio, each 5. All other varieties were mentioned three times or less. In 1913, the varieties which were mentioned the greatest number of times were in the following order: Rural New Yorker No. 2 and Carman, each 28; Delaware, 24; Irish Cobbler, 23; Green Mountain, 15; Empire State, 14; American Wonder, 13; Carman No. 1, Early Rose and Dooley, each 10; Early Ohio, 8; Carman No. 2 and Gold Coin, each 6; and White Elephant, Beauty of Hebron and Extra Early Eureka, each 4. In 1912, the varieties which were mentioned the greatest number of times were in the following order: Rural New Yorker No. 2, Green Mountain, Empire State, White Elephant, Early Rose, Irish Cobbler, Delaware, Early Ohio, Beauty of Hebron, Carman No. 1 and American Wonder. As some reporters mention Carman No. 1, others Carman No. 3, and still others simply Carman, it is difficult to classify these varieties. If we take into consideration the answers to enquiries of each of the past eight years we find that the Rural New Yorker No. 2 has been grown more extensively than any other variety, and this variety has been followed by the Empire State as the second most extensively grown variety.

In 1912, two varieties of late potatoes, two varieties of medium potatoes, and five varieties of early potatoes were used in the experimental competition. As most of these varieties had been tested for several years, and as the Davies' Warrior had made the highest records of the late potatoes, and the Extra Early Eureka of the early potatoes, it was decided that in 1913 the experiments would be confined to two varieties. The same two varieties were used in the co-operative experiments in 1914. The report, therefore, for each of the past two years has occupied a very small space. These two varieties of potatoes were successfully tested on no less than 310 farms in Ontario in 1913, and on 293 farms in 1914.

The following table gives the average results of the co-operative experiments with two varieties of potatoes successfully tested on 293 farms in 1914:

| Experiments. | Varieties. | Comparative Value. | Per cent. of small Tubers. | Mealiness when cooked. | Bushels of Whole Crop per acre. |
|---|---|---|---|---|---|
| Potatoes (293 tests) .. | Davies' Warrior..... | 100 | 10 | 92 | 153.22 |
| | Extra Early Eureka... | 86 | 15 | 100 | 95.86 |

The Davies' Warrior variety of potatoes made a high record at the College previous to the last two years. In 1913 and in 1914, it did not give quite as good results in the experiments at Guelph as it had done previously. This was probably due to the unfavorable weather conditions for a late variety, such as the Davies' Warrior. In 1913, the season was comparatively dry before the Davies' Warrior variety had matured, and when the later rains came a second growth was started which tended to make the potatoes somewhat irregular, slightly injuring the quality, and producing a larger number of small potatoes. In 1913, the Davies' Warrior gave an average of 134.1 and the Extra Early Eureka of 125.8 bushels per acre. In 1914, it will be seen that the average yield per acre of the Davies' Warrior throughout Ontario was 153.2, and of the Extra Early Eureka, 95.9 bushels per acre. The Extra Early Eureka variety gave comparatively low results in the past season. This has been an excellent variety of early potatoes. The results for 1914 show that the potatoes were of excellent quality, but owing to the lack of yield were not quite as popular as the Davies' Warrior variety. The Extra Early Eureka, which is apparently a selection from the Irish Cobbler, has made uniformly good returns at the College in past years. The Extra Early Eureka variety was also one of the freest from rot in 1912 when the rot was so prevalent in Ontario, and when the potatoes of such a large number of varieties became badly diseased. The Davies' Warrior was also comparatively free from rot. Of these two varieties the Extra Early Eureka was the most popular with the experimenters in 1913, and the Davies' Warrior in the past year.

### Stable Manure and Commercial Fertilizers with Farm Crops.

Within the past twenty-two years a large amount of co-operative experimental work has been conducted throughout Ontario in comparing stable manure and different kinds of commercial fertilizers with a number of farm crops. In the beginning of this branch of the work the experiments were made as simple as possible in order that the people conducting them could furnish complete reports. As experience has been obtained the work has gradually become more complicated and is improving in value from year to year. The results which have been obtained are of general value. A number of the experimenters in connection with the Association have been carrying on tests successfully for a number of years and are now in a position to conduct fertilizer work with a large amount of satisfaction. In each of the past five years we have been conducting successfully a test with fertilizers and barley of a similar nature to the co-operative experiments undertaken about twenty years ago in the United States under the direction of Dr. Atwater and which work proved to be a failure owing, no doubt, to the fact that the experiment proved to be too complicated for the men who had received no previous training in co-operative experimental work.

After some preliminary work had been carried on through the Experimental Union a general plan for co-operative work with fertilizers was adopted which included experiments with oats, fodder corn, and mangels. At a later date the

method was revised somewhat for the experiment with winter wheat and still later, to a greater extent with potatoes. The only crop used in 1914 in accordance with the general plan adopted about sixteen years ago was the one with winter wheat. The co-operative experiments with fertilizers on potatoes, mangels, and barley, are all under somewhat similar plans which have been arranged according to experience obtained from the former co-operative experiments conducted by the Union. We believe that the Experimental Union is carrying on co-operative experiments with fertilizers at the present time which are more comprehensive than those conducted at any other place. Information is being obtained which could not possibly be secured in any other way. It is true the work is subject to criticism but such is the case in connection with any experiments with fertilizers which have been conducted at any time and at any place.

For the co-operative experiments the fertilizers and the seeds have been sent from the College to experimenters each year. In the original plan the nitrate of soda and the muriate of potash were applied at the rate of 160 pounds per acre, and the super-phosphate at the rate of 320 pounds per acre. A mixture or complete fertilizer was composed of one-third the amount of these fertilizers, and was, therefore, applied at the rate of 213⅓ pounds per acre. Both the Royal Canadian and the potato fertilizer used in each of five years with the potato crop was applied at the rate of 320 pounds each per acre. The nitrate of soda was applied when the plants were about three inches in height, and all the other fertilizers at the time of sowing the seed. Farmyard manure was used in the experiment for the past ten years. The advice to each experimenter was to apply 500 pounds of average cow manure per plot, the application being equal to twenty tons per acre. The cow manure was mixed with the soil to a depth of from four to five inches, and the fertilizers were stirred in the soil to a depth of from one to two inches.

The foregoing description applies to all the co-operative experiments with fertilizers conducted previous to 1910, also those conducted in 1911 with winter wheat and with potatoes, and in 1912, in 1913, and in 1914 with winter wheat. Another experiment with fertilizers and barley was started in the spring of 1910, another with fertilizers and mangels in 1911, and still another with fertilizers and potatoes in 1912. The table here presented gives the average results of the co-operative experiments with fertilizers as described in the foregoing paragraphs:

| Kind of Fertilizer used. | Average Yield per acre. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Fertilizer per Acre. | | Oats. | Fodder Corn. | | Mangels. | Swede Turnips. | Potatoes. | Winter Wheat. Fertilizer applied. | |
| | | | | Total. | Ears. | | | | Autumn. | Spring |
| | Exact weight. | Approximate cost. | 5 yrs. 74 tests. | 8 yrs. 47 tests. | 8 yrs. 41 tests. | 5 years 41 tests. | 5 years 18 tests. | 5 yrs. 98 tests. | 8 yrs. 22 tests. | 2 yrs. 4 tests. |
| | Lbs. | $ c. | Bush. | Tons. | Tons. | Tons. | Tons. | Bush. | Bush. | Bush. |
| Nothing | ..... | ..... | 38.9 | 8.2 | 2.7 | 20.6 | 19.6 | 129.2 | 18.9 | 17.9 |
| Nitrate of Soda | 160 | 4 80 | 46.3 | 9.4 | 3.1 | 26.5 | 22.5 | 153.4 | 22.7 | 22.8 |
| Muriate of Potash | 160 | 4 00 | 43.8 | 9.4 | 3.0 | 24.6 | 23.7 | 160.8 | 22.3 | 24.9 |
| Superphosphate | 320 | 3 92 | 43.6 | 9.0 | 3.1 | 24.2 | 24.7 | 156.8 | 22.4 | 21.2 |
| Complete Fertilizer | 213 | 4 24 | 48.7 | 9.4 | 3.2 | 25.4 | 25.0 | 166.8 | 24.1 | 26.2 |
| Potato Fertilizer | 320 | 5 52 | ..... | ..... | ..... | ..... | ..... | 167.5 | ..... | ..... |
| Royal Canadian | 320 | 5 60 | ..... | ..... | ..... | ..... | ..... | 164.5 | ..... | ..... |
| Cow Manure | 40,000 (20 tons) | 6 00 | ..... | ..... | ..... | ..... | 26.9 | 174.7 | 26.3 | 23.0 |

The cost of each fertilizer as given in the table represents approximately under normal conditions the average cost per acre for the fertilizers as used in the co-operative experiments. The quotations were based on the factory prices for quantities of about one ton of each fertilizer. The twenty tons of cow manure would mean about twelve good sized loads per acre, and manure in Guelph has been selling at fifty cents per load, which is probably about the average for the Province. It is exceedingly difficult to place a price on farmyard manure, as in most cases it is not purchased, but is produced on the farm. Each person may place such value on the manure as he deems expedient, and study the results according to his own circumstances. It should be stated that the freight on the fertilizers and the application of both the fertilizers and the manure are not taken into consideration in the foregoing statement, nor yet is there any account made of the influence of the different fertilizers and the manure upon the land after the first season.

If we take into consideration the increases in the yields per acre from the different fertilizers and the average prices of the fertilizers per acre, as indicated in the foregoing table, we find that the increases in the different crops were secured most economically by the fertilizers, as follows:

Complete fertilizer with oats gave an increase of 9.8 bushels per acre at a cost of 42 cents per bushel.

Muriate of Potash with corn gave an increase of 1.2 tons per acre at a cost of $3.33 per ton.

Nitrate of Soda with mangels gave an increase of 5.9 tons of roots per acre at a cost of 81.4 cents per ton or 2.5 cents per bushel.

Complete Fertilizer with swede turnips gave an increase of 5.4 tons per acre at a cost of 78.5 cents per ton or 2.4 cents per bushel.

Complete Fertilizer with potatoes gave an increase of 3.9 bushels per acre at a cost of 10.9 cents per bushel.

Complete Fertilizer with winter wheat gave an increase of 5.2 bushels per acre at a cost of 82 cents per bushel when applied in the autumn and an increase of 8.3 bushels per acre at a cost of 51 cents per bushel when applied in the spring.

Each experimenter was asked to conduct his fertilizer test on the average soil of his farm. The results here presented are, therefore, for the average soils of Ontario. On some farms the fertilizers paid much better than they did on others. Every farmer who uses fertilizers should know as much as possible regarding the requirements of his own particular farm. The results here presented speak in a general way regarding the use of these fertilizers under the varying conditions of the farm lands of the Province and should furnish valuable suggestions.

### Ten-Plot Experiment with Fertilizers and Barley.

In 1910 arrangements were made for conducting an experiment with fertilizers and barley throughout Ontario. The experiment consisted of ten plots, seven of which received commercial fertilizers, one lime, one cow manure, and one was left unfertilized. For the seven plots which received commercial fertilizers, nitrate of soda, superphosphate and muriate of potash were used singly and in combination of two and three together. The number of pounds per acre of each fertilizer used was 100 for both the nitrate of soda and the muriate of potash and 200 for the superphosphate, whether these were sown separately or in combination. The lime was used at the rate of 1,400 pounds per acre and in the form of freshly slaked in 1910 and of hydrated in

each of the other four years. The cow manure was used at the rate of twenty tons per acre throughout. As in the case of the other fertilizer experiments, the nitrate of soda was applied in every instance when the plants were about three inches in height, and all the others were applied at the time of seeding. All the other applications for the fertilizer experiments with barley were the same as those for the fertilizer experiments previously reported. The average of the four reports of successfully conducted experiments for 1914 and of the twenty-six reports of the experiments conducted in the past five years are here presented:

| Fertilizer. | Individual Fertilizer per Acre. | Total Fertilizer per Acre. | | Yield per Acre. | | | |
|---|---|---|---|---|---|---|---|
| | | | | Straw (tons.) | | Grain (bus.) | |
| | Pounds. | Pounds. | Approximate Cost. $ | 1914 | Average 5 yrs. | 1914 4 tests | Average 5 yrs. 26 tests. |
| 1. Nothing | ..... | ..... | ..... | 1.18 | 1.20 | 38.00 | 31.49 |
| 2. Nitrate of Soda | 100 | 100 | 3 00 | 1.30 | 1.33 | 40.17 | 34.99 |
| 3. Muriate of Potash | 100 | 100 | 2 50 | 1.44 | 1.40 | 41.67 | 36.20 |
| 4. Superphosphate | 200 | 200 | 2 45 | 1.40 | 1.41 | 42.17 | 35.73 |
| 5. Nitrate of Soda | 100 | 200 | 5 50 | 1.40 | 1.43 | 43.17 | 38.75 |
| Muriate of Potash | 100 | | | | | | |
| 6. Nitrate of Soda | 100 | 300 | 5 45 | 1.42 | 1.41 | 42.67 | 38.89 |
| Superphosphate | 200 | | | | | | |
| 7. Muriate of Potash | 100 | 300 | 4 95 | 1.40 | 1.48 | 43.50 | 39.56 |
| Superphosphate | 200 | | | | | | |
| 8. Nitrate of Soda | 100 | 400 | 7 95 | 1.40 | 1.46 | 44.33 | 41.14 |
| Muriate of Potash | 100 | | | | | | |
| Superphosphate | 200 | | | | | | |
| 9. Lime | 1,400 | 1,400 | 4 60 | 1.46 | 1.38 | 40.67 | 36.72 |
| 10. Cow Manure | 40.000 (20 tons) | 40,000 (20 tons) | 6 00 | 1.56 | 1.55 | 44.00 | 40.48 |

This experiment has now been conducted throughout Ontario in each of five years in succession. There were four good full reports of carefully conducted experiments with fertilizers and barley in 1914. The good reports received in other years were five in 1910, six in 1911, five in 1912, and six in 1913. The yields per acre in 1914 and in 1913 were somewhat larger than those of the three years previous. The yield of barley per acre was the highest from the cow manure in 1910, 1911 and 1912, and second highest in 1914. The average yield from the complete fertilizer was the highest in 1914, second highest in 1910, 1911 and 1912, and third highest in 1913. The unfertilized land was the lowest in each year. The highest average yield per acre was produced from the complete fertilizer and the second highest from the farmyard manure. According to the increases in the yield of barley per acre and the prices of the fertilizers given in the table it appears that the increase was made at the smallest cost by the use of muriate of potash at the rate of one hundred pounds per acre. This application caused an average increase of 4.7 bushels of barley per acre per annum and the cost of the fertilizer was $2.50 or an average cost of about 53 cents for each bushel of increase. The most marked results from the fertilizers in 1914 were obtained on a sandy soil in Algoma, the increase being as high as 50 per cent. in one instance.

## Nitrate of Soda and Common Salt with Mangels.

An experiment was conducted throughout Ontario for five years in succession in the testing of different fertilizers with mangels. The results were very interesting and showed that an application of 160 pounds of nitrate of soda per acre applied to the land when the mangels were about three inches in height increased the yield of roots per acre by fully six tons, according to the average of the 41 separate tests conducted within the five years.

In the spring of 1911 another experiment was started with fertilizers and mangels. For this experiment nitrate of soda was applied to the mangels at the rate of 100, 160, and 200 pounds per acre at the same time as the seed was sown and also on separate plots when the mangel plants were about three inches in height. In comparison with the six plots with nitrate of soda, common salt was applied at the rate of 200 pounds and of 400 pounds per acre at the time of sowing the mangel seed. Two plots were left unfertilized in each experiment. In 1911, the first year of this experiment, no really satisfactory results which could be used in a tabulated form were received. In 1912, four, in 1913, two, and in 1914, three complete reports were obtained.

| Fertilizers. | | | | Average Yields of Mangels per acre (tons). | |
|---|---|---|---|---|---|
| When applied. | Kinds. | Quantity per acre. | Approximate cost per acre. | 1914. 3 tests. | Average three years. 9 tests. |
| | | Lbs. | $ c. | | |
| When Plants are three inches tall.. | 1. Nothing..... | ..... | ..... | 21.88 | 27.31 |
| | 2. Nitrate of Soda. | 100 | 3 00 | 23.68 | 30.53 |
| | 3. " " | 160 | 4 80 | 23.92 | 32.49 |
| | 4. " " | 200 | 6 00 | 29.12 | 35.49 |
| At the time Seed is sown ..... | 5. " " | 100 | 3 00 | 22.24 | 30.24 |
| | 6. " " | 160 | 4 80 | 24.84 | 32.04 |
| | 7. " " | 200 | 6 00 | 27.28 | 34.12 |
| | 8. Common Salt.. | 200 | ..... | 24.68 | 31.47 |
| | 9. " " | 400 | ..... | 25.32 | 30.73 |

In the former experiment which was conducted throughout Ontario for a period of five years and of which we obtained forty-one good reports, it will be remembered that the mangel crop was increased six tons per acre by an application of 160 pounds of nitrate of soda. In the results here presented it will be seen that 160 pounds of nitrate of soda applied when the plants were three inches tall increased the yield of mangels 5.2 tons per acre and that the same quantity of nitrate of soda applied at the time that the seed was sown increased the yield of mangels 4.7 tons per acre. It will, therefore, be seen that the application of 160 pounds of nitrate of soda per acre has given very satisfactory results in all the experiments in which it has been tried. The results presented in tabulated form furnish information regarding the increases from the other applications of nitrate of soda which are worthy of careful study. Four hundred pounds of common salt gave about the same average yield of roots per acre as one hundred pounds of nitrate of soda. The yield of mangels per acre has been increased or decreased according to the amount of nitrate of soda which has

been applied. The highest average yield of roots per acre in the average of the past three years was produced from 200 pounds of nitrate of soda per acre applied when the plants were about three inches in height. This increased yield of 8.18 tons at a cost of $6 for the fertilizer would amount to 73 cents per ton or 2.2 cents per bushel. It will, therefore, be seen that the result of the co-operative experiments conducted throughout Ontario in each of eight years has shown that the application of nitrate of soda has been quite economical in the production of the mangel crop. This experiment will likely be continued in the same way in at least two more years.

### Six-Plot Experiment with Fertilizers and Potatoes.

As a result of experiments conducted at the Ontario Agricultural College in each of five years it was found that the Royal Canadian and Potato Fertilizer gave the highest yield of potatoes per acre of the different fertilizers used in the five-year experiment. In another experiment, extending over a period of five years, in which several fertilizers were used, the highest yield per acre was obtained from a mixed fertilizer similar to the one used in our co-operative experiments, and which was composed of nitrate of soda, muriate of potash and superphosphate in the proportion by weight of 1, 1 and 2, and which was applied at the rate of 213 pounds per acre. This was followed by the Royal Canadian and the Potato Fertilizer, each of which was applied at the rate of 320 pounds per acre. Based on these and other results, a co-operative experiment was conducted in each of five years previous to 1912, in which six different fertilizers were compared with each other, with farmyard manure, and with no fertilizer with potatoes. The average results of this experiment conducted within the five-year period on 98 farms of Ontario were reported in 1911. The average results of the 98 experiments showed the yield of potatoes per acre to be as follows: Unfertilized land, 129.2 bushels; 160 pounds of nitrate of soda, 153.4 bushels; 160 pounds of muriate of potash, 160.8 bushels; 320 pounds of superphosphate, 156.8 bushels; 213 pounds of the complete fertilizer previously described, 166.8 bushels; 320 pounds of Potato fertilizer, 167.5 bushels, 320 pounds of Royal Canadian fertilizer, 164.5 bushels, and 20 tons of cow manure, 174.7 bushels. According to the prices given for the manure and the fertilizers in the report of 1911, the increased yield of potatoes was produced at a cost per bushel for the complete fertilizer of 11.3 cents; muriate of potash, 12.7 cents; cow manure, 13.2 cents; superphosphate, 14.2 cents; Potato fertilizer, 14.4 cents; Royal Canadian fertilizer, 15.9 cents, and nitrate of soda, 19.8 cents.

Based on the results of past experiments it was thought wise to start a co-operative experiment in testing different quantities of fertilizers per acre in comparison with each other, with farmyard manure alone, with farmyard manure and fertilizer, and with unfertilized land. We therefore placed on our list an experiment with fertilizers, cow manure, and no fertilizer with potatoes, in the spring of 1912, and we conducted experiments in 120 places throughout the Province in each of the past three years. In each of these years we divided the number into four groups of thirty each, and used the Royal Canadian fertilizer for one group, the Potato fertilizer for another, a fertilizer composed of nitrate of soda, muriate of potash, and superphosphate, in the proportion by weight of 7, 9, and 16, for another, and a fertilizer composed of nitrate of soda, muriate of potash and superphosphate, in the proportion of 1, 1 and 2 for the fourth group. Each of the first three fertilizers were applied alone at the rate of 320,

640, and 960 pounds per acre, and 320 pounds in combination with ten tons of cow manure per acre. In comparison with these, another plot received cow manure at the rate of twenty tons per acre, and one plot was left unfertilized. For No. 4 group the fertilizer was used in the same proportion, with the exception that the minimum amount was 213 instead of 320 pounds per acre. Owing to the unusual weather conditions in 1912 the potato rot was very prevalent and many of the results of the fertilizer experiments obtained could not be used on that account. There were, however, nineteen good reports of successfully conducted experiments with fertilizers and potatoes obtained in which the rot did not prove troublesome and which represented fairly well the four different kinds of fertilizers distributed. In 1913 we received in all thirty-one good reports, there being from six to ten good reports for each group. In 1914 twenty-eight good reports of successfully conducted experiments were received, there being exactly seven good reports for each separate test. We therefore have for the three years seventy-eight good reports of successfully conducted experiments. The following table gives the average results of the fifty-eight reports of the successfully conducted experiments of the first three groups in the past three years and also the average results of twenty tests made in the last three years with fertilizers of group 4:

| Fertilizers and manure. | Quantity per acre. Pounds. Groups 1, 2 and 3. | Yield of potatoes per acre (bus.) Groups 1, 2 and 3. Average 3 years. 3 sets. 58 tests. | Yield of potatoes per acre (bus.) Group 4. Average 3 years. 20 tests. |
|---|---|---|---|
| 1. No Fertilizer | ..... | 128.3 | 142.3 |
| 2. Fertilizer | 320 | 150.1 | 165.9 |
| 3. Fertilizer | 640 | 161.2 | 180.4 |
| 4. Fertilizer | 960 | 175.0 | 190.4 |
| 5. Fertilzer<br>Cow manure | 320<br>20,000 (10 tons) | 175.1 | 194.1 |
| 6. Cow manure | 40,000 (20 tons) | 177.6 | 194.3 |

The fertilizers used for groups 1, 2 and 3 were somewhat similar in composition, all containing nitrogen, potash and phosphoric acid. The results as here presented are those from general fertilizers used in different quantities on what might be termed the average soil of Ontario, as the experiments were conducted on 58 different farms. It will be seen that on the average there was an increase in the yield of potatoes per acre of 21.8 bushels from 320 pounds of fertilizer; 32.9 bushels from 640 pounds of fertilizer; and 46.7 bushels from 960 pounds of fertilizer. The yield per acre increased as the amount of fertilizer used became greater. From a study of these results it would seem as though the first 320 pounds of fertilizer increased the yield 21.8 bushels; the second 320 pounds, 11.1 bushels; and the third 320 pounds, 13.8 bushels. It will also be observed that the 20 tons of cow manure per acre increased the yield of

potatoes 49.3 bushels or 2.5 bushels per acre more than the combination of 10 tons of cow manure and 320 pounds of fertilizer per acre. The average results of the twenty tests in group 4 are fairly similar to those of the other three groups already discussed. The amount of fertilizer for plot 2 in group 4 consisted of 213 instead of 320 pounds per acre and is identical with the complete fertilizer used for five years throughout Ontario in experiments conducted on 98 farms, the results of which are presented in the first table in this report on Fertilizers with Farm Crops. From a study of the results in the foregoing table the increases in the yields of potatoes which were made at the lowest cost in the average results for the three years were obtained from 320 pounds of complete fertilizer as represented by groups 1, 2 and 3 and from 213 pounds of the fertilizer composed of nitrate of soda, muriate of potash, and superphosphate, in the proportion by weight of 1, 1 and 2. In the last result referred to there was an increase of 23.6 bushels per acre produced at a cost of approximately $4.24 for the fertilizer which would be about 18 cents for each bushel of increase in the potato crop.

A MEMBER: How do you apply the fertilizers?

PROF. ZAVITZ: It is sown broadcast.

A MEMBER: How do you sow it, in the fall?

PROF. ZAVITZ: The Superphosphate and Muriate of Potash are sown at the time of seeding, and the Nitrate of Soda is sown when the plants are about three inches high.

MR. T. H. MASON: The question of fertilizers is a very important one, and will become, as the Province grows older, of still greater importance. I am very glad that we are doing work in this connection, and hope the work will be increased.

PROF. HARCOURT: I would like to say a word in regard to potash. This year it will be a minus quantity among our fertilizers, at least there will be a small amount of potash in the country, and that will be used largely in the mixed fertilizers. Potash salt has always been obtained from Germany. They have a monoply of the supply of potash, therefore, Muriate or Sulphate of Potash this year will be practically impossible to procure. Now, I do not know but what this fact may be an unmixed blessing to us here, in that the potash we have in our soils, and it is an immense amount, will be properly worked from the soil. The soil is the source we should look to for our fertilizers of potash, and it is only in cases of heavy potash consuming crops that we ought to use much of the imported potash fertilizers. Even our sandy soils will carry 40,000 pounds per acre, ploughable depth. Some of our sands carry more than that, and in some instances it has been shown that they carry more than our clays. Take the Norfolk sands, which are gravelly sands, and they are richer in potash than many of our peaty soils. Our largest consuming crop for potash is mangels. An average crop of mangels takes three hundred pounds of potash from an acre. A crop of oats takes away about forty pounds, which would hardly be appreciable taken from the 40,000 pounds that we have in the average soil to a ploughable depth. A large quantity of the potash removed by these crops would be below the ploughable depth. What we can do in methods of cultivation which will bring that supply into an available condition, before we can develop it into a fertilizer and get it into shape for a crop, depends on how we look at the question of organic matter, because it is only in bringing the potash into solution that we can get the use of it for a crop. We cannot get the use of the fertilizers which nature has provided in the soil until we have obtained the organic matter, and worked the whole into a right physical condition to insure the conservation of the

moisture in the soil; nor can we get the results from these materials until we have obtained the lime to correct the acidity, and to effect the soil beneficially in the numerous ways in which it does affect it. While we may say a great deal about fertilizers, we must look to the lime and the organic matter before we consider these.

A MEMBER: Did you have a large acreage for your experiments?

PROF. ZAVITZ: It is not necessary to have a large acreage. The labor is a large item in making experiments on a large scale.

A MEMBER: What percentage of hull has O.A.C. No. 72?

PROF. ZAVITZ: About 27 per cent. hull; Banner has about 30 per cent. hull, and some others will have about 36 per cent. hull.

MR. T. H. MASON: That is a very important point.

PROF. ZAVITZ: Yes, it is one that is very often overlooked. There are not many people who realize that one variety of oats will have 10 or 12 pounds more meal than another variety. Take two different varieties, one giving two and one-half per cent. more than the other, and it means one million dollars ($1,000,000) increase in the production for Ontario, so that you see how important it is to improve the varieties.

A MEMBER: How much is the seed of that O.A.C. No. 72 worth, and is it sold by the dealers?

PROF. ZAVITZ: There was a small quantity sold last year. This year the quantity will be largely increased.

A MEMBER: How can you compare cabbage and rape?

PROF. ZAVITZ: From our experiments we have got very good results from cabbage.

A MEMBER: The price of seed is very much higher for cabbage?

PROF. ZAVITZ: I mentioned in my report that the price of rape seed is about 10 cents per pound, while scarcely any of these cabbages can be purchased for less than $1.50 per pound for seed; that is for Old Country cabbage, and if you buy in this country it is more. I know of some varieties that sell for about $3 per pound.

A MEMBER: What variety is that?

PROF. ZAVITZ: One of the varieties which gave us the best results is the Sutton's Earliest Drumhead Cabbage; that is an Old Country cabbage.

A MEMBER: Have any of the local seed men got that?

PROF. ZAVITZ: I do not think that they have that variety.

A MEMBER: How can we get that seed?

PROF. ZAVITZ: From Sutton & Sons, Reading, England.

A MEMBER: What is the name of the rape?

PROF. ZAVITZ: Dwarf Essex.

A MEMBER: How did the Sutton's Earliest Drumhead cabbage compare with the others in yield?

PROF. ZAVITZ: It gave a larger yield.

A MEMBER: What is the price of kale?

PROF. ZAVITZ: Kale would come in about intermediate between rape and cabbage.

A MEMBER: Would kale be better than rape?

PROF. ZAVITZ: No, I do not think that kale would be more valuable than rape. Rape is a great sheep feed. At the time Prof. Shaw was here they pastured over 600 lambs on rape in one autumn; it is a great pasture crop; a great crop for fattening lambs and growing cattle; but as a pasture it is not so good for dairy cows.

A MEMBER: I have been told that Mr. John Taylor has grown acres of cabbages for feeding purposes, for years, and he is one of the very best farmers.

PROF. ZAVITZ: Yes, I remember the name.

A MEMBER: Are there roots in this cabbage like rape?

PROF. ZAVITZ: I do not know of any difference in that respect.

A MEMBER: Will rape injure tile drains?

PROF. ZAVITZ: I have never heard that it would. Have you ever found it doing so?

A MEMBER: Yes, I found it myself. You can see them growing right through the tile drain.

PROF. ZAVITZ: That is the first time that I have ever heard of the roots of rape interfering with tile drains.

A MEMBER: I have heard it mentioned in other cases.

PROF. ZAVITZ: How deep were the tile?

A MEMBER: They would vary from 2½ to 3 feet deep.

PROF. ZAVITZ: We are getting some striking evidence.

A MEMBER: I have sown rape over and over again with oats, and have had a good crop.

PROF. ZAVITZ: I do not favor sowing oats with the rape, for I find that if you have a big crop of oats the rape will not amount to very much.

A MEMBER: How much seed do you sow to the acre; five pounds?

PROF. ZAVITZ: Three or four pounds to the acre is enough when sown broadcast. When you are sowing rape in drills 1½ or 2 pounds is quite sufficient.

A MEMBER: Do you work it into the soil on stubble land?

PROF. ZAVITZ: Yes, sow your rape broadcast and harrow it over.

A MEMBER: How deep do you plant?

PROF. ZAVITZ: The seed should be covered about 1 inch deep.

A MEMBER: Which method of sowing gave the best yield?

PROF. ZAVITZ: Sowing rape in drills gave the larger yield per acre.

A MEMBER: Have you conducted any experiments with mangels? What distance apart would you thin mangels?

PROF. ZAVITZ: We have conducted experiments by planting them 4, 8, 12, 16 and 20 inches apart, and we have ten different tests by weight, and we find we get the highest yield of mangels per acre when they are planted closest together. For instance, mangels 4 inches apart will give a greater yield than those planted 8 inches apart: those planted 8 inches apart a greater yield than those planted 12 inches apart, 12 inches greater than 16 inches, and 16 inches apart greater than 20 inches.

A MEMBER: When I had mangels 16 inches apart I got 1,000 bushels, at 12 inches apart 1,035 bushels, but when they were planted at 4 inches apart there was a yield of over 1,300 bushels per acre. Taking everything into consideration, labor, etc., we like to have our mangels about 10 inches apart.

A MEMBER: That is entirely different from our experience. Our experience has been that when mangels are 20 inches apart we get a much larger yield.

PROF. ZAVITZ: I used to think just the same.

MR. T. H. MASON: Here is where the skill comes in.

PROF. ZAVITZ: How many distances apart did you grow those mangels?

A MEMBER: From 10 to 20 inches, side by side.

PROF. ZAVITZ: For how many years?

A MEMBER: For three years.

PROF. ZAVITZ: And some were 10 inches and some were 20 inches?

A MEMBER: Yes, we found that they looked much the best about 10 to 12 inches apart, which is just the width of the hoe, but when we came to harvest them, we were surprised.

PROF. ZAVITZ: Have you actually weighed them?

A MEMBER: No, but we measured them.

PROF. ZAVITZ: We are bound to get some very sure results if we try these things side by side, carefully weigh the crops annually, and repeat our experiments for a number of years. We found that when we increased the distance between the roots, with two different varieties, the experiment conducted in duplicate in each of five years, we increased the average size of the roots, but we decreased the total yield per acre.

A MEMBER: Do they require clean cultivation?

PROF. ZAVITZ: If you have them further apart you might have to work harder; it would make a little difference; the average farmer would not be able to give them perhaps all the cultivation he would like, and that would be all the more reason for having them planted closer together. We aim to keep our land here under an average state of cultivation; we have a four year rotation; we use no commercial fertilizer; in the three years we are removing from the land three crops, and when farmers understand what we are doing they claim that we are a little severe on our land, more severe than they are on their own farms.

A MEMBER: Referring to growing the mangel crop different distances apart; would not the smaller mangels grown closer together be harder on the land and harder to work?

PROF. ZAVITZ: We would be in favor of the closer grown mangels even though it meant more work.

A MEMBER: How far apart do you sow your rows of mangels?

PROF. ZAVITZ: We have tried them in rows 26 inches, 32 inches, and 40 inches apart. We get a larger yield from rows 26 inches apart than we do from 32, and a larger yield from 32 than from 40.

A MEMBER: Do you sow on the level, or in ridges?

PROF. ZAVITZ: We sow on an average clay loam on the level, and we get about two-thirds of a ton per acre better yield as compared with ridge cultivation. As a rule we put them in on the level; on dry land it holds the moisture better: on heavy clay land, and land that is not easy to work it might be better to put them in ridges.

A MEMBER: Is it necessary to have land in a high state of cultivation?

PROF. ZAVITZ: It is not absolutely necessary, but the better state of cultivation your land is in the better crop you are likely to get, but you can get a very good crop when the land is not in such a high state of cultivation. Much depends upon the subsoil, for the mangel is a deep rooted plant.

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## IMPORTANT RESULTS FROM THE USE OF LEGUME BACTERIA ON ALFALFA AND OTHER LEGUMES.

PROF. D. H. JONES, O.A.C., GUELPH.

For the year just past, a total of 3,467 cultures of Legume Bacteria, each culture sufficient for one bushel of seed, were distributed for various seeds as follows:

Alfalfa, 2,763; red clover, 407; alsike clover, vetches, sweet peas, beans, white clover, sweet clover, crimson clover, 297.

The distribution of alfalfa cultures by Provinces is as follows:

Ontario, 1,621; British Columbia, 689; Saskatchewan, 241; Alberta, 133; other Provinces, 79. The total number of farmers to whom cultures were sent was 1,418, of whom 1,162 received cultures for alfalfa.

As heretofore, blank reports were sent to recipients of cultures asking for the results of their seed inoculation, and data compiled from the reports returned show the inoculation beneficial in 79.7 per cent. of cases.

In this connection it is interesting to note that 430 cultures were sent to the Department of Agriculture, Victoria, B.C., for distribution to the farmers of British Columbia with samples of alfalfa seed. At present we are awaiting the report of the net result of these experiments.

SUMMARY OF RESULTS IN SEED INOCULATION, 1905-1914.

| Year. | Total Cultures Sent. | Total Reports Received. | Inoculation Beneficial. | Inoculation not Beneficial. | *Others. | Per Cent. Favorable. |
|---|---|---|---|---|---|---|
| 1905 | 246 | 134 | 91 | 40 | 3 | 69.4 |
| 1906 | 375 | 144 | 72 | 48 | 24 | 60.0 |
| 1907 | 372 | 187 | 67 | 57 | 63 | 54.0 |
| 1908 | 2,113 | 699 | 397 | 237 | 65 | 62.6 |
| 1909 | 2,017 | 494 | 211 | 161 | 122 | 56.7 |
| 1910 | 3,375 | 771 | 344 | 179 | 248 | 65.7 |
| 1911 | 4,941 | 1,307 | 453 | 371 | 483 | 55.0 |
| 1912 | 4,772 | 885 | 412 | 141 | 332 | 74.0 |
| 1913 | 3,154 | 580 | 199 | 92 | 288 | 68.2 |
| 1914 | 3,467 | 541 | 260 | 67 | 214 | 79.7 |

*In this column are included reports from farmers who sowed no uninoculated seed, or in which long continued drouth, excessive moisture, or some other condition injured or destroyed the seeding. These are not figured in the percentage column.

A MEMBER: Do you send out instructions with the bottle; instructions as to how to apply?

PROF. JONES: Yes, the instructions are sent on a small sheet that is wrapped around the bottle, and on that sheet full and explicit instructions are given for the application of the bacteria.

A MEMBER: One thing I notice is this: there is a great difference in the percentages of the reports for the different years.

PROF. JONES: Yes.

A MEMBER: Have you noticed any difference in the character of the seasons?

PROF. JONES: No, we have not taken note of these particular conditions. The reason why there should be such variations we cannot state definitely, but it is perhaps due to the fact that in some districts, to which cultures were sent, the cultures were not needed: that is to say, the bacteria were already in the soil. That is possibly one explanation. Whether the rainfall of these different seasons had any effect or not I could not say. The bacteria themselves would not be materially affected in seasons in which it is possible for plants to grow at all.

A MEMBER: When you put the bacteria on the seed, do you cover it with a drill?

PROF. JONES: Yes, sunlight is an antiseptic; also, in some cases, providing the exposure is sufficient, the sunlight proves a disinfectant. This sunlight will destroy bacteria, and if we expose some seeds that have been inoculated in the laboratory we find a large number of seeds are destroyed in half an hour. Hence, if the seed is sown broadcast by hand, it is very desirable that one or two harrowings follow the sowing to cover the seed.

A MEMBER: How much soil would be equivalent to a culture?

PROF. JONES: A cart load or two cart loads per acre should give a fair result, but you would not get as good results the first year as you would the second year, because the bacteria will gradually multiply in the soil. In this method of seed inoculation, that we are practising at the College, the bacteria are brought directly in contact with the seed, and are there when the young plants send out their rootlets.

A MEMBER: Is this used on garden seeds?

PROF. JONES: No results are obtained from the use of bacteria with any other plants than those of the legume family which includes peas, beans, soy beans, and all the clovers.

A MEMBER: In regard to peas, does that include ploughing down, or using for a cover crop?

PROF. JONES: The question is raised; in what way are these organisms beneficial if the crop is to be ploughed down? When the crop is removed, providing these bacteria have been working on the roots you will get a larger mass of sod and a larger root development turned in. The way in which the bacteria benefit the plant is this: they enable the plant to feed on the free nitrogen in the atmosphere. You all know the nitrates are amongst the most expensive of the fertilizers, and the nitrates are beneficial on account of the fact that they have the nitrogen in an assimilable condition. Now this bacteria works in conjunction with the plant by some means which we do not know, and is able to feed on the free nitrogen in the atmosphere. As a result of this bacteria we get a larger growth of the crop for which they are used, a bigger return when harvesting, and a larger root mass when turned in by ploughing; so it is very beneficial for the crop, and for the soil.

A MEMBER: I sometimes sow peas in the fall after another crop, or in midsummer to plough down for manure that fall. Would there be any use in using that bacteria on a crop of that kind, to enrich the land?

PROF. JONES: Well, if the bacteria are in the land it is not necessary. You can determine that for yourself by observing the roots of your plants to see if any of these nodules are present. There would be no trouble in observing them if they are there.

A MEMBER: I have examined the roots of my plants and I find they are literally covered with these nodules from one end to the other.

PROF. JONES: Then, in that case, you do not need the culture because the bacteria are already there.

A MEMBER: Would it be the bacteria from peas?

PROF. JONES: The pea bacteria are very easy to distinguish from those of the clovers, for the bacteria on peas are very much larger.

A MEMBER: It was from a field of clover, alsike or lucerne, that I pulled up the plant just to see what was on it, but I could not tell the kind of clover from the bacteria.

PROF. JONES: It may have been red clover, or some other of that family. In the older parts of the Province the land is very richly seeded with the bacteria of most of the clovers, and the seed if sown on that land will readily germinate.

A MEMBER: Would this answer in the case of Black Medick?

PROF. JONES: Yes, Black Medick is of the clover family. The same test would apply to Black Medick. You could examine the roots of your plants. In the older parts of the Province where the soil is already well seeded with bacteria the culture

is not needed, but in cases of alfalfa, and particularly in the newer parts of the Province, you would require the use of cultures. That is the reason of the great percentage of favorable reports received from the treatment of alfalfa in these districts than from the treatment of red clover.

## RESULTS OF CO-OPERATIVE EXPERIMENTS IN APICULTURE.

MORLEY PETTIT, PROVINCIAL APIARIST, GUELPH.

The season of 1914 will go down in the history of Ontario bee-keeping as one of the poorest for honey production ever known. A number of guesses could be made as to the cause of this crop failure, such as the winter injury of clover, drought or cold nights during the blooming period, but we might as well be exact and put it down to "unfavorable climatic conditions." Bees wintered better than usual, and a better spring for building up could not be desired. In some sections clover bloomed profusely, but there was very little honey anywhere.

The average crop reported for the Province was about 16 lbs. per colony, as opposed to an average of over 100 lbs. per colony in 1913. As usual the average crop reported by experimenters is much better than the general average, the experimenters reporting on their crops having a 35 lb. average. This will, of course, be modified by the fact that some experimenters became discouraged and sent no report, but the fact remains that the careful beekeeper always secures better returns than his indifferent neighbor.

The effect of the general failure on results from co-operative experiments is very marked, as the honey flow is one of the greatest factors controlling the behavior of bees. When they are gathering honey copiously successful management is comparatively easy. With a light flow they swarm excessively, while the manipulations necessary for control are made much more difficult by the increased tendency to rob. With no flow at all the swarming problem is eliminated and the robbing tendency is again increased.

The most popular experiment of the season was a new method of introducing laying queens to queenless colonies. It was quite natural that this experiment should attract wide attention, because the spread of European Foul Brood requires wholesale requeening and gives increased prominence to the problem of queen introduction. The method tested, while not always successful, has proven its worth to stand in the front rank of known methods for performing this operation.

While many experimenters were unable to send complete reports, owing to the nature of the season, the number of testimonials as to benefits derived from the experiments indicates that the year was not lost to the Experimental Union. One of the most flattering of these comes from Leonard T. Floyd, Central Norton, N.B., when he states: "I learned more by last year's experiment than I got from all the books and papers I ever read." This indicates that doing a thing is the biggest part of learning it. Wm. Burger, of Ridgeway, Ontario, writes: "The swarm whose queen I got from you last year is a wonderful swarm, the biggest I ever saw. If you send any queens out this year send me one." Another man writes: "I will be more careful in the future, giving my report if I have any honey or not, because I am much pleased with the benefits I have received." We may now consider the experiments in order.

### Experiment No. 1.

*Prevention of Natural Swarming in Extracted Honey Production by Holding the Colony Together.*

This method has now been sent out as an experiment for five years in succession and continues to be the most popular and the most successful method of swarm prevention advised.

Seventy-four applications were received for this experiment, and in addition to a number of letters mentioning benefits derived, nine reports came from nine different counties. These experimenters had a total of 276 colonies spring count, and 373 colonies fall count. Their total honey crop was 10,270 lbs., being an average per colony of 37.2 lbs. The per cent. of natural swarming from colonies of Lot A managed according to instructions was 5 per cent., and from colonies of Lot B 35 per cent. The average honey crop per colony from Lot A was 3 lbs., more than from Lot B. This shows a decided advantage gained, not only in reducing the percentage of natural swarming, but in raising the honey yield.

### Experiment No.2.

*Prevention of Natural Swarming in Comb Honey Production by Artificial Shaken Swarming.*

Twenty-three applications were received for this experiment, and five reports were sent in at the end of the season. As a poor season affects comb honey production even more than it does extracted honey, the reports from this experiment are especially poor. It may be stated, however, that these five reporters had 215 colonies of bees in the spring and 251 colonies in the fall, and reported a total honey crop of 9,358 lbs., being an average of 43.5 lbs. per colony, spring count.

In reference to this experiment Chas. Reynders, of Ulster, Pa., writes as follows:—"Your way is O.K. I will give up the old way." Miss M. L. Newland, Rt. 2, Cainsville, Ontario, who, by the way, is managing 150 colonies of bees, and tried experiment No. 2 writes as follows:—"The one colony given starters drew out one more super of foundation than those hived on foundation and did its capping more thoroughly. The season did not warrant any experimenting. Lot B was not examined for queen cells, as there was no indication of swarming tendency. I shall hope to try the experiment again next season, and then have the pleasure of sending in a complete report. Average crop per colony 1913, 123 lbs.; 1914, 41½ lbs."

It may be explained that for comb honey production we recommend shaking swarms on starters in the brood chamber instead of full sheets of foundation in order to encourage the bees to do more work in the supers by restricting their building material in the brood chamber.

### Experiment No. 3.

*Prevention of Natural Swarming by Manipulation of Hives Instead of Combs.*

As this experiment has not been explained previously in these annual reports I shall outline briefly the method which experimenters were asked to try.

When a colony of Lot A is found to be ready for a super, that is when the brood chamber is full of bees, lift the hive and set it to one side, off its stand.

Place an extra bottom board on the old stand and set on that a brood chamber of empty worker combs. Next remove the colony from its bottom board and set it on top of this, cover up warmly, contract the entrance if necessary, and leave until the next visit. We now have on the old stand a hive consisting of the following parts: Bottom board, brood chamber of empty worker combs, which we shall call the new brood chamber, above that the old brood chamber and then the cover. As heat always rises, the brood is now in the warmest part of the hive for the changeable weather of spring. Any dark spring honey brought in will also be stored in the old brood chamber at the top. Whenever this becomes crowded with brood or honey, the queen goes down into the new brood chamber to lay. If she does not need the extra room it does no harm.

When the clover flow starts lift the old brood chamber off and set it down on a hive stand. Then examine the new brood chamber and if no eggs are found take one comb and exchange for it a comb of open brood from the old brood chamber. Next the queen is placed in the new brood chamber, which is covered with a queen excluder, on that a super of extracting combs and the old brood chamber on top of that. The queen will now have plenty of room to lay and honey storing will start in the extracting super. The young bees finding that the queen does not come up to lay eggs in the old brood chamber will start queen cells there. Now the swarming impulse has been disposed of for the whole season, especially if the queen is young and vigorous and ordinary precautions are taken to provide storage room and ventilation from time to time.

There is still the old brood chamber to be disposed of. If left where it is the cells vacated by hatching brood would be filled with clover honey, which, when extracted, would mix with the fall and spring honey, producing an inferior grade. In fact this is one of the most valuable features of this method of management, namely, the fact that the removal of the old brood chamber takes all dark honey from the hive at the beginning of clover. On the next visit a week later the old brood chamber will be found to contain brood which is mostly capped, also some queen cells. It is now in prime condition to lift off for a nucleus.

Experiment No. 6, was intended to be a modification of Experiment No. 3, namely, by removing the queen from the hive entirely. As there were only eleven applications for the latter experiment, instructions were not prepared for it, but the applicants were sent instructions for Experiment No. 3. There were seventeen applications for No. 3, which combined with the eleven for No. 6, made twenty-eight experimenters who received instructions for this experiment.

Six reports were received, the experimenters reporting 254 colonies spring count and 290 colonies fall count. The honey crop was 9,665 lbs., an average of 38 lbs. per colony.

One man writing in March, 1914, in reference to this experiment, states: "That last two years I have put one box in the bottom instead of on top and stopped the entrance to the old hive. The queen then made a brood nest below and as the young bees hatched out of the old hive the bees filled it with honey. I then put on a third story. I had 120 lbs. of honey from each hive treated that way and no swarms." Another man writes: "With regard to Experiment No. 3. I found the method fairly satisfactory. I was not troubled much by swarming, although in one or two cases I found queen cells which I pulled out. My greatest objection to the method of raising the brood chamber is that unless the queen is driven down and a queen excluder placed between she will not go down nor would the bees place any honey below this season."

That has been the experience of quite a number of experimenters with this method in a poor season. I am inclined to think that it is better to place the first set of empty combs above the brood chamber. This can be done early in May without risk of chilling brood, provided the hives are in winter cases. The queen goes up and takes possession of empty combs above her much more readily than she goes down.

EXPERIMENT No. 4.

*Method of Spring Feeding to Stimulate Brood Rearing.*

EXPERIMENT No. 5.

*Method of Packing Bees When Taking Them From the Cellar.*

These two experiments were combined and the same instructions sent to applicants for either. The instructions are embodied in a twelve page booklet, which first tells how to take bees out of the cellar, then how to feed those that need special feeding for stores. It afterwards gives a simple method of providing protection to colonies which have been removed from the cellar early in the spring. A method of stimulative feeding is then described and three or four different kinds of feeders which may be used for this purpose.

There were fifty-four applications for this experiment and six reports were received. These reported 243 colonies spring count and 269 colonies fall count, with a total honey crop of 5,325 lbs., being an average of 32 lbs. per colony. Results show that colonies fed stimulatively and given spring protection gave a slight increase in the honey crop for the season, but owing to the fact that the spring was particularly good for colonies building up under any conditions and the summer was particularly bad for storing a honey crop, too much importance cannot be attached to the results obtained in such an unfavorable season.

Fred Smith, of Craigvale, reports, that he is satisfied that feeding is effective in preparing bees for an early honey flow, while F. G. Miller, of Hawkesbury, states, that the weather was fine all spring and lots of nectar came along so did not need stimulative feeding. He is satisfied, however, that spring protection pays well, for his bees did better than his neighbor's across the road. Mr. Reynders is convinced that there is not much need of spring feeding, as he saw no perceptible difference between good colonies fed or not fed.

It may be stated here that the advantage of spring protection of cellar wintered bees is probably settled without a doubt, but the advantage of spring stimulative feeding is still very much in question. We find equally successful bee-keepers ranged on both sides. In apiaries troubled with European Foul Brood, however, it is generally conceded that after the introduction of Italian queens, the next most important thing is to see that there is a continuous supply of feed from day to day whether from natural sources or given artificially.

EXPERIMENT No. 7.

*The Smoke Method of Introducing a Queen to a Full Colony.*

Introducing a queen to a full colony by whatever method, is one of the important and difficult operations of the apiary. The usual plan recommended by those who sell queens is a good one, but is not always successful. The following plan reported in "Gleanings in Bee Culture," in June, 1913, by Arthur C. Miller, of Providence, R.I., has proven very successful in the hands of those who have tried it.

The system is as follows: A colony to receive a queen has the entrance reduced to about a square inch with whatever is convenient, as grass, weeds, rags or wood, and then about three puffs of thick white smoke is blown in and the entrance closed. It should be explained that there is a ⅞ inch space below the frames, so that the smoke blown in at the entrance readily spreads and penetrates to all parts of the hive. In from fifteen to twenty seconds that colony will be roaring. The small space at the entrance is now opened; the queen is run in, followed by a gentle puff of smoke, and the space again closed and left closed for about ten minutes when it is reopened and the bees are allowed to ventilate and to quiet down. The full entrance is not given for an hour or more, or even until the next day.

To colonies long queenless—particularly if suspected of having a virgin queen—it has been found advantageous to give a comb with eggs and young larvæ just before running in the queen. The theory of the cause of the success of this method is this: Bees in distress, whether workers, drones, or queens, know no enemy or alien, and every one is turning to some other for "help" or food, and every bee which comes within the influence of the uproar of a distressed colony seems to be seized with the same emotion. The closing of the entrance after the queen is in is to ensure the distressed condition throughout the entire colony, and keeping it closed for ten or fifteen minutes is to prevent too speedy relief. The inexperienced and the thoughtless need to be cautious as to two things, namely, closing in a full colony without giving the bees room to spread into and get off from the brood, and closing in a full colony sitting in the sun in the middle of a sweltering day.

There were 112 applications for this experiment and thirty reports were received. Eighteen of these were successful and twelve were unsuccessful. The cause of failure was usually the failure to follow directions closely, the worst trouble being that so many experimenters cannot have patience to leave the hive alone for four or five days after introducing the queen. This is one of the most important points in using any method of queen introduction. Some report looking in the next day or the day after and seeing the queen balled right before their eyes. This was caused of course, by opening the hive too soon after introducing the queen.

I cannot do better now than quote from some of the letters received with reference to this experiment: "I have found it exceptionally satisfactory. Have introduced this season by the smoke method about fifteen queens. Only once did the bees kill the queen, but I blame my own actions rather than the method for this."—J. A. Caldwell, Smithville, Ont.

"I have tried the smoke method of introducing queens with only three so far. I lost one out of the three. The one I lost was in a single story, while the other two had one super on each. I have been using the fasting method and have been very successful, having lost only one queen in about one hundred during the last two years. I think the smoke method would be very valuable as it is so quickly done if it can be made a success."—Horace Haines, Rt. 2, Welland, Ont.

Mr. C. Lawton, of Cookstown, who is farm manager for the Hon. J. S. Duff, Minister of Agriculture, gives the following detailed report: "May 29th.—Cool weather; one queen to a two-frame nucleus taken same day from parent hive: accepted. June 7th.—To a nucelus made May 28th, cut out cell at time of introducing: accepted. Very hot, white clover coming nicely, but no nectar. June 10th.—One safely introduced to a nucleus made May 31st. Left queen cell which was destroyed; no honey coming in. June 14th.—One safely introduced to a

hive which had been a 5 lb. package from Florida and had killed its queen, also one introduced by cage method. This queen was laying June 17th. Weather showery, no nectar coming in but feeding syrup. June 10th.—Five safely introduced to nuclei made June 7th. All laying in three days. One introduced to a hive with a last year's queen which was killed by the new queen. June 17th.—Tried six but only one was accepted. Day was cool and showery and I was in a hurry as I had to leave home. Returned five hours later and found robbing going on."

Mr. Lawton's experience proves that the method is successful under quite a variety of conditions; also he was successful in one case in requeening without dequeening by this method.

R. H. Bedell, Rt. 5, Belleville, Ontario, reports as follows: "I have had success so far with six queens. The first three were introduced to four and five frame nuclei. The weather was fair and cool. It was about 2 or 3 p.m. and there was very little honey being gathered. The colonies were hybrids, black and Italian crossed. About one-half or three-quarters of an hour before introducing the queens I had shaken the bees in front of the hive and allowed them to run in through a queen excluder so as to catch the queen and drones. There was no division board in the hive and only a 3/8 inch space below the frames. On account of the large vacant space in the hives I gave them four puffs of smoke instead of three. The queens which I introduced were accepted. The remaining three were introduced in fair sized colonies, which had been queenless about five days. The colonies had one super each and five sheets of foundation were scattered through each hive and there were no queen excluders. The queens were young and had been laying four or five days in nuclei. The space below the frames was only 3/8 inch, but I took pains in aiming the smoke at each side of the hive and then at the centre. There was a very slow flow of honey coming in."

Another experimenter reports: "I tried the smoke method on one queen and lost her. Thought I had the smoker going about right, but later a picture in 'Gleanings' showed that the smoker was not going nearly well enough." This shows the importance of attention to little details in applying the method. Another man writes: "I have introduced about twenty-eight queens this season: five by the smoke method and the rest by the fasting method. The five were all lost but two, and the others were all safely introduced by the fasting method."

By the fasting method referred to the queen is placed in a cage without attendants and without food for about thirty minutes. She is then allowed to enter the hive which has been previously dequeened, and is accepted because she is so hungry that she shows neither fight nor fear.

### The Special Experiment on Races of Bees.

Application forms for this experiment were sent to the bee-keepers in counties where European Foul Brood is known to exist, also to members of the Experimental Union. The material sent is an untested queen of the Italian race purchased from some reliable queen breeder. The experimenter is asked to introduce this queen to some colony or nucleus and give her the best of care and report later on her value as a breeder and the value of her bees as resisters of European Foul Brood.

One hundred and six bee-keepers applied for this experiment and received one queen each. Later thirty of these reported that the queens had been successfully introduced and the colonies were going into winter quarters in good condition. We shall hope to have a goodly number of reports from these next year.

One report received in the fall of 1913 is particularly good. It is as follows: "The queen you sent me was introduced into my worst case of European Foul Brood and it is now one of my strongest colonies and free from disease. She certainly is a good queen as the colony was so weak that they did not gather over ten pounds of white honey."

The following are some reports received from those to whom we sent queens in 1913 for testing in 1914:

"Re queen received in June, 1913, from J. B. Case for testing, may say that her colony has so far resisted foul brood and are excellent honey gatherers."—J. R. Mills, Richmond, Ont.

"In 1913 I received queen for testing. It cast off swarm in 1913 and the two wintered successfully. They do a little better than my hybrids."—David Dewar, Petrolia, Ont.

"The queen that was sent me turned out as follows: 1st E. F. B. I have none; A. F. B. no better to resist than blacks. 2nd as to honey they were much better; best colony Italians, 75 well filled sections, best blacks not 50. Very tame, build up earlier in spring. Bees a trifle tender regarding cold days. They are by far the best bee."—Frank M. Powell, St. Catharines, Ont.

"The Robey queen you sent me in 1913 was introduced and did well. I raised some nice queens from her; some of them were dark, although one of the dark ones was the cleanest and best to gather honey I had in 1914. I believe the queens you send out are the choicest that the breeders can produce.

"The queen I got from you in June, 1914, was safely introduced and did well. I built her up to start swarming impulse, then I requeened the rest of the bees from her."—T. W. Frood, Renfrew, Ont.

"The queen I received from A. D. D. Wood, in 1913, was successfully introduced into a colony with European Foul Brood. They cleaned it out and were well prepared for winter. Wintered in fine condition and did well as honey gatherers in 1914, considering the season. They did not swarm, although they were very strong and appear to be wintering all right so far.

"In June, 1914, received queen from E. Mott, built up very strong colony, but not much honey. I had to feed for winter."—G. M. Hern, Niagara Falls, Ont.

"The Howe queen you sent me in 1913 is a beauty; wintered fine, built up and gathered some surplus. I never had anything like this strain of bees. I consider them practically immune from European Foul Brood. They are non-swarming, gentle, good honey gatherers, cap comb honey all right. If I could have had such queens twenty-five years ago at $10.00 each I would have been away ahead now."—R. Lowey, Woodrows, Prince Edward County.

"In reference to the queen sent me in June, 1913, will say that I successfully introduced her, built up a strong colony and they came through the winter in first-class shape giving me in 1914 about 40 lbs. of first-class section honey.

"You will remember about four years ago foul brood was the nightmare of the bee-keeper. Since then by tests and observations it has practically become the safety valve of the bee-keeper. For the simple reason that if any bee-keeper

allows his queens to become degenerate the disease appears. I claim that you have done more to promote bee-keeping in the past two years by the distribution of queens than was done in twenty years before. It gives any man, especially a beginner, such a demonstration of facts that if he does not heed it, out he goes."—John Ray, Fort Erie, Ont.

### Experiment No. 10.

*Wintering Bees Outside in Quadruple Hive Box.*

One hundred and forty-four applications were received for an experiment on wintering bees out-doors, four hives in a box. Directions were sent to these experimenters and we shall hope to have reports from them early in the season of 1915.

### Conclusion.

There were 541 experimenters all told. These had in the spring of 1914, 15,490 colonies of bees, an average of 28.6 colonies each. Forty-five of these persons have kept bees for 25 years and over; 88 between 10 and 24 years; 93 between 5 and 9 years and 180 under 5 years. One hundred and thirty-five did not report the number of years they had kept bees. There is a great variety of hives kept but 341 experimenters have their bees in Langstroth hives.

The kinds of bees kept are as follows: 7,222 colonies of Italian bees, 5,422 crossed Italian and black bees, and the balance 2,846 are principally common black bees. This shows a marked gain in the number of Italian bees kept.

Twenty-six experimenters who reported their crop for 1914 had 988 colonies spring count, an average of 38 colonies each. They had 1,183 colonies fall count and a honey crop of 34,608 lbs., being an average of 35 lbs. per colony spring count.

In conclusion five hundred and forty-one persons received instructions and material for conducting experiments in bee-keeping in 1914, and while many failed to send formal reports, the resultant volume of correspondence shows that great benefits have been derived which cannot well be tabulated.

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## REPORT OF THE SCHOOLS' DIVISION OF THE EXPERIMENTAL UNION FOR 1914.

Prof. S. B. McCready, Guelph.

The Schools' Division of the Experimental Union was organized in 1909, and this is the sixth annual report that has been made of its work. It has been carried on as what might be called the extension work of the Nature Study Department, having chiefly for its clientele the teachers in the rural schools of Ontario and the 250,000 boys and girls attending these schools. The Nature Study Department was established in 1903 as that part of the Macdonald Institute which would deal with the redirecting of rural education along agricultural lines, mainly through the training of teachers. Since its establishment about twelve hundred trained teachers have come under its instruction in one or three months' short

courses. And through the Schools' Division hundreds of other teachers have received practical help in the planting material and instruction sheets that have been sent out.

This spring material was furnished to very nearly five hundred schools, scattered all over Ontario. Fifty counties or districts are represented in the distribution, Middlesex, Kent, Elgin, Perth, Lambton, Simcoe, Bruce and Oxford, leading in the number of schools co-operating.

### The Outcome of Teaching Agriculture.

Lack of time and space forbids the telling in any detail of what resulted from the distribution. To be convinced of the possibilities for revivifying the work of the country schools through the teaching of agriculture one would need only to read a few of the reports sent in by teachers. I am convinced that it is through the kind of leadership being displayed by many of the teachers represented in these reports, that we will best meet and solve Ontario's rural problem.

In these reports are to be found records of very varied school activities carried out or directed by teachers. Many tell of the good work that has been done by their School Progress Clubs in keeping the school and school grounds tidy, of making repairs, of developing leaders through class debates, of carrying out the arrangements for the school fairs, of looking after the school garden in summer holidays, of conducting the experimental plots, of introducing improved strains of poultry or grain into their neighborhoods—a training in service, which prepares well for that type of citizenship needed in the country if our needs in co-operation are ever to be met.

Many tell of the little school fairs which brought the people together in a social way to see their children's school work, to watch their games, to hear them sing and incidentally to derive new conceptions of the work of the country schools that are to be. Several tell of the school undertakings to help the Patriotic Fund and the Red Cross Society, at one school all the boys as well as the girls helping to knit things. Some report that the pupils raised money by selling garden produce to purchase pictures, balls or playground equipment. One teacher tells of the work with a Babcock milk tester carried on by herself and the older pupils by means of which the good cows of the neighborhoods were "discovered."

In many places through the beautiful flower beds on the school grounds the schools have become the local beauty spots and people have been led to visit them from miles around. Some schools have excited the neighborhood interest in their experiments and demonstrations in their school-farms. Bouquets have been sent to the aged and the sick, or to the churches and Sunday schools; vegetables have been given to poor people. Many homes have had donations of sage or summer savory, perennials or new kinds of vegetables. Many report that the homes have been directly affected, the yards kept tidier, and flower beds put out. And everywhere the school has come to mean more to its community.

In the teaching of Agriculture and the conducting of the garden, perhaps the following are some of the best things reported: the school and the home (the two great educational factors in a child's life) are brought close together and into a working partnership, discipline is made easy, pupils and teachers become companions, fighting and quarrelling cease, a new spirit of helpfulness replaces the old spirit of indifference and opposition, parents visit the school when the agriculture is being taught—and incidentally the position of the teacher and all that she stands for is enhanced.

It is not to be inferred that all reports are filled with stories of successes. A few tell other tales: of indifference of trustees, of antagonism of parents, of unresponsive pupils, and of temporary defeats. But with it all this must be concluded, that, given fair chances, the teaching of agriculture will bring large returns to a community, the children and the teacher!

### Three Specific Cases of "Doing Things."

Let me offer just three brief reports to show the nature of the work and how it is developing. The first is a letter from a teacher in the eastern part of Ontario. She hasn't been specially trained for this kind of service—but her work is rural leadership of the highest order.

November 7th, 1914.

Dear Mr. McCready: It just occurred to me that you would be interested in the result of my attempt to start a school garden out here.

"I called a meeting of my trustees at the beginning of October, and explained to them what 'Agricultural Education' would mean to their children. They that evening decided to hold a School Bee on October 20th. Meanwhile, I visited all the ratepayers, explained our object, and got the promise of a load of good earth, one of barnyard fertilizer, or of maple trees, from each one. None refused.

"October 20th was a rather dreary day, but the men came with their loads. They cleaned up the school ground, planted maple trees, dug flower beds and borders, and plowed a good, large plot for school garden, after enriching garden and beds with good earth and fertilizer. They also removed a great many loads of stone from garden and grounds. They certainly were a busy and cheerful crowd. Now all is in readiness outdoors for our spring work.

"This is a section which has had the name of being thoroughly opposed to anything along agricultural lines in schools. I doubt if they ever before understood what was meant. Our Inspector seems delighted with results."

This letter has within it the explanation of the country's tardiness to take up the work: "I doubt if they ever before really understood what was meant."

The second is from a Halton County teacher's report. It shows the inherent interests of agriculture which make it useful for educational purposes.

"For yesterday's lesson I told the children to find out how many cows they had at home, their breeds, and why they kept those breeds. Well, they began to give their reports and reasons. When one was talking that would suggest something to half a dozen others, so there was a shower of hands up all through the lesson, each waiting his or her turn. I was due at our Township Hall at 3.30 but could not get the pupils stopped, nor did they stop till four, when I simply had to stop them. It certainly was interesting. I wish I were better qualified to handle such subjects. I learn as much as the children from their discussions."

Does anyone know of any other school subject so interesting that pupils will "Keep the teacher in" until four or after four in order to get more of it!

The third is from a Bruce County teacher who has found the "worth whileness" of it. She says:

"This is my third year in this school. If you knew the children then and could see them now, you would realize what the introduction of agricultural work is doing for the boys and girls of Ontario.

"The whole atmosphere of our school has changed. Girls and boys vie with each other in 'helping the teacher.' Last winter's sewing lessons from four to five o'clock on Friday seemed to completely change the girls. Two years' garden work has changed the boys. When I first knew the pupils they, with perhaps three exceptions, had to be forced to do any little service. Now the only difficulty is to choose from the volunteers!

"The teacher and pupils of this school are doing better work and are happier in their work because of the introduction of agriculture into their school."

It is a far, far greater thing than disseminating agricultural knowledge or inducing "greater production" merely for the making of greater gains. It is making a finer citizenship. If we could get teachers like that to stay three years in every country school in Ontario, what couldn't be done!

## CO-OPERATIVE EXPERIMENTS IN WEED ERADICATION FOR 1912, 1913 AND 1914.

Prof. J. E. Howitt, O.A.C., Guelph.

These co-operative experiments have now been conducted for three years. The object of this work is to have, carried on by men on their own farms, experiments in the eradication of weeds, the results of which will furnish data from which definite statements may be made regarding the best methods of controlling the various bad weeds. At the present time we have very little reliable information concerning the best methods of dealing with our various bad weeds on different kinds of soils and under various conditions of cultivation and cropping, and hence the necessity for such experiments.

In commencing this work it was thought wise to begin with a few of our most troublesome weeds and add others from year to year if the experiments progressed satisfactorily with the hope that in time exact information might be obtained concerning the eradication of most of our troublesome weeds of Ontario. This work has progressed rather slowly. It has been hard to get men to co-operate in it for various reasons and even harder to get them to carry out the directions for the experiments and make satisfactory reports of the results they obtained. However, sufficient experiments have been successfully carried out and reported upon during the past three years to furnish considerable valuable information about the eradication of the various weeds experimented with.

The weeds selected for the experiments in 1912 and 1913 were Perennial Sow Thistle, Twitch Grass, Bladder Campion and Wild Mustard. This year (1914) Ox-eye Daisy was added to this list. Seven experiments in all were outlined for this year, namely:

1. The use of rape in the destruction of Perennial Sow Thistle.
2. A system of intensive cropping and cultivation, using winter rye followed by turnips, rape or buckwheat, for eradicating Perennial Sow Thistle.
3. The use of rape in the destruction of Twitch Grass.
4. A method of cultivation and cropping for the destruction of Twitch Grass.
5. Method for the eradication of Bladder Campion or Cow Bell.
6. Spraying with iron sulphate to destroy Mustard in cereal crops.
7. A method of cultivation for the destruction of Ox-eye Daisy.

During the past three years forty-five men co-operated in this work, including eight District Representatives of the Ontario Department of Agriculture. Thirty-six of these carried out the directions for the experiments and reported the results obtained. Summarizing the reports received it is found that seven men tried experiment No. 1, "The use of rape in the destruction of Perennial Sow Thistle." Three reported the method entirely successful, three only partially successful and one reported it a failure owing to exceedingly dry weather preventing the rape growing properly. One of the men who obtained only partial success did not carry out the directions completely.

Five men tried experiment No. 3, "The use of rape in the destruction of Twitch Grass." Four reported the method a complete success, and one reported it a partial success. This man, however, did not carry out the directions for the experiment in detail; he sowed the rape broadcast instead of in drills.

Five men tried experiment No. 4, "A method of cultivation and cropping for the destruction of Twitch Grass." The experiment requires two seasons to complete. One man completed the experiment and reports success with the method. At the end of one year one man reported success as far as the experiment had progressed, two men partial success and one man reported it a failure.

Three men tried experiment No. 5, "A method of cultivation and cropping for the eradication of Bladder Campion." All reported that they found the method a complete success.

Fifteen men tried experiment No. 6, "Spraying with iron sulphate to destroy Mustard in cereal crops." Fourteen reported the method a success and one reported but partial success.

No satisfactory reports have yet been received of experiments 2 and 7.

In conclusion it may be said that the reports received of these co-operative experiments indicate: First, That good cultivation followed by rape sown in drills provides a means of eradicating both Perennial Sow Thistle and Twitch Grass; Second, That rape is a more satisfactory crop to use in the destruction of Twitch Grass than buckwheat. Third, That rape gives much better results in the eradication of Twitch Grass and Perennial Sow Thistle when sown in drills and cultivated than it does when sown broadcast. Fourth, That thorough deep cultivation in fall and spring followed by a well cared for hoed crop will destroy Bladder Campion. Fifth, That Mustard may be prevented from seeding in oats, wheat and barley by spraying with a twenty per cent. solution of iron sulphate without any serious injury to the standing crop or to fresh seedings of clover.

Points of interest brought out by the experiments in spraying with iron sulphate to destroy Mustard were:

1. The necessity of spraying early, just when the plants are coming into bloom. If the spraying is left too late, the older plants will not be destroyed by the solution, and will form seed, and hence the experiment will not be entirely satisfactory.

2. To spray thoroughly, and with a good pressure. In order to spray thoroughly with an ordinary broadcast attachment, it is necessary to keep the horses walking very slowly. If an attempt is made to cover the ground quickly, some of the plants will be missed, and the results will not be satisfactory.

3. In regard to the cost of spraying with iron sulphate it was found that the cost of material per acre varied from $1.00 to $2.40. If the iron sulphate is bought wholesale, it can be purchased at $1.00 per cwt., so that $1.50 to $2.50 per acre should cover the entire cost of spraying.

PROF. ZAVITZ: Professor Howitt has undertaken work that I believe has not been undertaken in any other place; that is experimental work in weed eradication; and while sometimes a discussion will drag on, and it is almost impossible to close it off, this is an important matter and Prof. Howitt is here. He has gone to work in a systematic way to eradicate weeds, and now is the time to have a really intelligent discussion on the eradication of Mustard by spraying.

A MEMBER: What sort of a sprayer is best?

PROF. HOWITT: I may say that the ordinary barrow sprayer, a pump sprayer, is used such as that for spraying fruit trees, with a broadcast attachment. You have to keep the power on in order to keep the mixture in the form of a fine mist.

This is only satisfactory when the man works hard at the pump. A power sprayer fitted with a broadcast attachment is better.

PROF. ZAVITZ: How many have had any experience in spraying for Mustard?

A MEMBER: I bought a lot alongside of me that had one field that was fairly covered with Mustard. I did not think that it was so bad at the time of buying, but I found out that the Mustard was rapidly coming and increasing. It was so thick I had to spray twice. On first thoughts I was going to plough it up, when I thought of applying to some professor here to take the job of eradication. I made application here and they sent me Prof. Howitt. We agreed to wait for a wet day before spraying. A power sprayer was secured with a broadcast attachment and started. We sprayed the biggest part of the field and left a part not sprayed, as we were not able to go over the whole of it. After a few days I was able to get time to spray the rest of the field, but it was late. What Mr. Howitt and I sprayed in twenty-four hours had made a complete change in its colour; it was brown, and I think in about a week it was dead; dead to the very tips of the roots with the exception of some places which we had missed. However, I found out that that field of Mustard was dead and produced no seed whatever. I think it is a very successful way to get rid of Mustard. Since then I have kept the field in some crop every summer and I think I have the Mustard under control at the present time. The spraying was completely successful.

PROF. ZAVITZ: I would confirm what is said in regard to the use of Rape for killing weeds. I remember when we first went into the field where the Experimental Grounds are now located (that is some years ago), in a low piece of land, probably a quarter of an acre, we found the land badly infested with Twitch Grass. We took away the fence. I remember we gathered the sods; we wanted to build that low place up, and in the sods there was a lot of Twitch. I remember we did what is usually done quite differently: we manured the land and worked it on the surface until about the end of June, and then ridged it up and later on put in Rape, about two pounds of seed to the acre, the rows being twenty-eight inches apart. We cultivated it for a while about the same as for turnips and the leaves soon spread over the ground and made a smothering crop in that section of the experimental ground. When we cut the rape off we had twenty-seven tons and it completely killed the Twitch. All that was left in this whole section was one little plant. You are not losing the land but leaving the land in good condition for another crop.

A MEMBER: Have you had any experience with Black Medick?

PROF. HOWITT: We have had very little experience with Black Medick. It is a weed of not very great importance.

A MEMBER: I might just say that my experience is exactly the same as that of Prof. Howitt's, in regard to killing Twitch Grass with rape. For twelve years we followed the regular rotation and killed a few of the weeds in that way; then we heard that the only way was to work the land. We tried that, but we found that we always left some for seed when we ploughed the land. We took a patch of about four acres one year, and it was so bad with Twitch Grass that a cultivator would not work nicely through it when it had an ordinary coating of manure. We started early in the spring and cultivated it, before we started seeding. As soon as seeding was over we kept the land cultivated. About the first of July we sowed rape and no weeds came up; it needed very little cultivation and I never saw such a crop of rape. This practice has always been a success with me.

MR. T. H. MASON: That is a very satisfactory testimony, I am sure.

A MEMBER: I would like to see Prof. Howitt experimenting down in Kent County with Wild Morning Glory.

PROF. HOWITT: That is more commonly known as Bindweed, and we have not had any experience with it.

A MEMBER: I have not yet found a man who has been able to entirely eradicate it.

PROF. HOWITT: This weed has been on some of the College grounds for twenty years, and the land here has always been farmed well, it has been kept under control, but outside of that it seems impossible to entirely eradicate it. Some experimenters have claimed that covering small patches with tar paper will destroy it, but we found that to be an entire failure. Some experimenters have claimed that if you apply a special mixture of Sulphate of Iron, which is bought in crystals, you could kill it, but we have found that also a failure. We have also tried covering it with sawdust, and that is a failure; we have also tried salt, but have not been able to get rid of it.

MR. T. H. MASON: How would a two years' summer fallow do?

PROF. HOWITT: I have heard of it being practiced, but the weed started all over again.

MR. T. H. MASON: Over the lighter lands in the Province I have seen large patches of Toad Flax. I have often heard the question asked: Will weeds grow where there is the ordinary rotation and intensive cultivation? Some claim there is no trouble at all. I had an experience of that sort of thing and I farmed light land. I asked the people in the locality if it was a dangerous weed and they assured me it was not. I went in for intensive cultivation—corn was part of our rotation, every third year—and I think the more I cultivated the more I spread the weed. Whenever a root got from the machine to the land it was ready for the next season.

PROF. HOWITT: I agree with you that Toad Flax is a more dangerous weed than we think, especially on light land. This last year I cultivated one corner fifteen times and another corner ten times, and I found Toad Flax on the land at the end of the season.

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## REPORT OF THE COMMITTEE APPOINTED TO MAKE A STUDY OF THE WEED ACTS OF CANADA.

PROF. J. E. HOWITT, CHAIRMAN, O.A.C., GUELPH.

The Committee appointed to make a study of the present Weed Acts of the different Provinces of Canada realized that they had a large and serious task before them, and thought it advisable to proceed slowly, and to begin at home by investigating the effectiveness of the Ontario Act to Prevent the spread of Noxious Weeds. With this object in view the following questioneer was sent out to 600 townships and 144 villages.

## INVESTIGATION CONCERNING THE EFFECTIVENESS OF THE ONTARIO ACT TO PREVENT THE SPREAD OF NOXIOUS WEEDS.

At the Annual Meeting in January of the Ontario Agricultural and Experimental Union, a committee was appointed to make a study of the present weed acts of the different provinces of Canada, and, if thought advisable, to make suggestions as to how the eradication of weeds in Ontario could be made more effectual.

### NOTICE WELL.

If this form is not returned it will be taken for granted that your Township Council has done nothing to carry out the provision of the Ontario Act to prevent the spread of noxious weeds.

QUESTIONS RE ONTARIO ACT TO PREVENT THE SPREAD OF NOXIOUS WEEDS.

1.—Is any attempt being made in your township to enforce the Provincial Act to prevent the spread of noxious weeds?

.....

2.—Has your Township Council ever appointed an inspector to enforce this Act in respect to noxious weeds ripening seeds on occupied and unoccupied land or on the property of railway companies:

.....

3.—If such inspector has been appointed, has he been able to successfully enforce the Act?

.....

4.—Have the overseers of highways (path masters) or road commissioners, in your locality enforced successfully the provisions of this Act in regard to cutting or destroying the noxious weeds growing on highways of road allowances within their respective divisions?

.....

5.—Are you in favor of the strict enforcing of this Act as it now reads, and do you think that the provisions made for its enforcement are adequate?

.....

6.—Have you any suggestions to offer as to how this Act might be improved?

.....

Kindly answer the above questions as fully as possible, using the space left after each question for that purpose, and return form to J. E. HOWITT, Chairman of Investigation Committee, Ontario Agricultural College, Guelph, Canada.

One hundred and sixty-eight reports were received out of the 600 townships in Ontario. In 92 townships of the 600 attempts were being made to enforce the Act. In 49, inspectors have been appointed. In regard to the work of inspectors, 17 townships reported the work of the inspectors satisfactory, 14 reported that the work was partially satisfactory. Out of the 600 townships of the Province, 15 reported that the Act was successfully enforced, 72 that it was partially enforced, and 73 that it was practically a dead letter.

As this notice was put on the questioneer: "If this form is not returned it will be taken for granted that your Township Council has done nothing to carry

out the provision of the Ontario Act to prevent the spread of noxious weeds," it has been taken for granted that in only 15 townships of the 600 of the Province of Ontario has the Act been successfully enforced.

Various suggestions as to how the present Act might be made more effective were received from various townships who reported on the working of the Act. All agreed that something should be done to make the weed inspectors independent of local sentiment and local politics. Many suggested that more weeds should be listed as noxious according to the Act, and some suggested that the appointment of the inspectors should not be left optional with the township councils.

After making a study of the effectiveness of the Ontario Act to prevent the spread of noxious weeds your Committee thought it advisable to put before the members of the Union for their consideration the following suggestions as to how the present Ontario Act to prevent the spread of noxious weeds might be made more effective:

1. By an organized effort upon the part of the Ontario Department of Agriculture, through the agency of Farmers' Clubs, Farmers' Institutes and the District Representatives of the Department of Agriculture, to make the farmers of Ontario acquainted with the provisions and regulations of the Ontario Act to Prevent the Spread of Noxious Weeds.

2. By amending the present Act so as to make it compulsory for every township council to appoint an inspector whose duty it shall be to see that the provisions of the Act relating to the destruction of weeds are carried out.

3. By the Ontario Government appointing county or district inspectors, who shall supervise the work of the township inspectors, and report to the Government any neglect of duty upon the part of the said inspectors.

4. By extending the present Act so as to prevent the following weeds maturing and ripening their seeds:

1. Wild Oats (*Avena fatua*).
2. Curled Dock (*Rumex crispus*).
3. Clustered Dock (*Rumex conglomeratus*).
4. Purple Cockle (*Agrostemma githago*).
5. False Flax (*Camelina sativa*).
6. Wild Mustard (*Brassica arvensis*).
7. Wild Carrot (*Daucus carota*).
8. Field Bindweed (*Convolvulus arvensis*).
9. Ribgrass (*Plantago lanceolata*).
10. Common Ragweed (*Ambrosia artemisiifolia*).
11. Ox-eye Daisy (*Chrysanthemum leucanthemum*).
12. Canada Thistle (*Cirsium arvense*).
13. Chicory (*Cichorium intybus*).
14. Perennial or Field Sow Thistle (*Sonchus arvensis*).
15. Burdock (*Arctium minus*).
16. Wild Barley or Squirrel-tail (*Hordeum jubatum*).

Other weeds added to this list by the Township Council with or by the consent of the Minister of Agriculture.

MR. T. H. MASON: I remember eight years ago, when I went out to Alberta, it was divided into some ninety districts, in each of which a local inspector was appointed by the Provincial Government, and at the head was a chief inspector actually at work, going all over the Province receiving communications from local

inspectors appointed simply to enforce the Act. The Province had just then been formed. At that time most of the people of Alberta were endeavoring to keep it clean. They had a very active inspector in the Province, a Mr. Mitchell. He was a Scotchman who did not care what a man's politics were; he would go up against an elevator company, or anyone else. Later Mr. Mitchell joined the Dominion Government staff, and I do not know how well the Act is being enforced to-day.

Mr. T. Creighton: I was out West a little less than a year ago, and had the pleasure of attending one of the Annual Conventions of the weed inspectors there. At that convention questions pertaining to weed control and seed control were discussed, and I noticed that a spirit of a broad nature actuated those men; they studied the subjects that should be brought to the attention of the farmers in their districts. The inspector lived out of the district where he did his inspecting. They discussed the application of the Act in respect to farmers refusing to pay a fine, and in such instances where farmers were not very well off.

A Member: Just a brief reference as to some features of the work in Ontario which I think might serve as an example to the principles outlined by Mr. Howitt. In dairy instruction work some years ago, we employed local men to look after the testing, to direct the operations of checking up the weight, and to give them advice, but there were so many local opinions brought to bear that that work was not effective until we appointed men quite independent of local opinions, and also quite independent of the Association. These men received their salary from the Government, and made their reports to the Government. As soon as we got that system we found a better quality of work throughout the whole Province of Ontario. I heard buyers state at the Convention last year in Eastern Ontario, that some years ago there was some difficulty in getting a uniform lot of cheese; that he had to go through some 5,000 cheeses to secure his 500 of uniform quality, but the year before last his inspector stated he felt quite safe through the greater part of the season, in taking the first 500 cheeses that came in and branding them as first quality. That shows what is meant by having men work along uniform lines.

Prof. Zavitz: I am very glad this question has come up in a definite way. The matter has been discussed here and at various farmers' institutes, and people fully recognize that the Weed Act of Ontario is of very little use. Mr. Lennox, who is on the Committee, is a scientific man. The Honorable Nelson Monteith, who is also on the Committee, is a scientific man and a practical man. They have been looking after the matter and have presented their report. They have presented it in definite form and the question is: will we continue the Committee for another year?

Prof. McCready: There is one part of the report as presented by Mr. Howitt that especially appealed to me as being along promising lines: the feeling that the thing which lay underneath and behind this was education. The step they have taken in presenting this report is a step in the right direction. To me, there is one particularly promising feature of this report, and that is in regard to the educational development in the Province. The children in the schools are being instructed in the matter of weeds, through their nature study, in many of the country schools, and through encouraging them in making collections for school fairs. We are getting the young generation all over the Province, to know the difference between all our common weeds: that cannot fail before long to result in scientific eradication. I think the Committee should be commended for their investigations and be encouraged to shove the matter forward. I do not know

just what particular steps should be taken here, but we might have a resolution passed here. At any rate, I have very much pleasure in moving that the Committee be continued in this work, and that this report be adopted by this Experimental Union and the Committee given power to do whatever they think best.

MR. T. H. MASON: You have heard the resolution of Professor McCready.

Moved by PROF. MCCREADY, seconded by MR. SQUIRRELL: "That this Committee be continued with full power to act under the resolution as they see fit." Carried.

Brief addresses of an encouraging nature were delivered by Mr. N. W. Rowell, leader of the opposition in the Legislature, and W. B. Roadhouse, Deputy Minister of Agriculture.

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## THE WEED PROBLEM.

MR. W. J. LENNOX, OTTAWA.

We heard this afternoon that 60,000 tons of weed seeds and screenings are brought from the North-West, of which 10,000 tons are retained in Canada, largely in the Province of Ontario. What an immense amount of weed seeds! Something like 2,000,000 bushels came down from the North-West last year. What is going to happen when we have, say, four times the present acreage under cultivation? Where grain production is continued from those districts infested with weeds, and with very little inspection, we are bound to have a tremendous increase in weeds, and the weed question has already become a very serious one. This was a clean country in its first years. When the land was first cleared we had a few burdocks and some other minor weeds, but at that time we had the country fairly well pastured; we had a large number of sheep on the soil, and sheep certainly, in those days, helped to keep down the weeds. As the country has grown older the introduction of weed seeds from all parts of the world has so increased that the weed question has grown to be a very severe problem indeed.

It is cruel kindness to bring a weed inspector to this platform, after listening to the address of the previous speakers on this subject. However, I agree with the suggestions made, and being here, I will say what I can in support of the able address given by Prof. Howitt on weed eradication. There were two very important questions discussed this afternoon in the report of the co-operative experiments carried on under Prof. Howitt in the eradication of noxious weeds in the Province of Ontario. I think previous to this time we had very little information from the practical farmer as to the best methods of eradication of our noxious weeds. In travelling through this country, in the interests of the Pure Seed propaganda, we find that a great difference of opinion exists as to the best methods to be employed in the eradication of certain weeds. Take, for instance, in Simcoe County, where you find sow thistle. If you were driving through Simcoe County you would say at once that sow thistle was the worst weed in the County. They have so much of it that they have turned to some other weed; I hardly ever hear of farmers trying to eradicate sow thistle in Simcoe County. In the fall, with such an implement as the broad share cultivator, the sow thistle could at least be kept in check. In that County the twitch grass is almost as bad as sow thistle. It is a pleasure now to know that we have substantial evidence to prove that the perennial

sow thistle, bladder campion, wild mustard, and twitch grass, and other weeds can be effectively controlled, and we should study the methods which Prof. Howitt has shown to be effective. In the eradication of twitch grass I may say that on our farm at home we had fairly good luck with rape in cleaning the fields of this weed. Unfortunately, in these experiments, the rape was not sown in drills, which, I believe, is the more effective method. In 1912, we sowed fall wheat, this was followed by rape the next year sown in the latter part of June, and in the fall of that year we could not find any twitch grass in that field.

Now, I would like to support the arguments that have been put forward as suggestions for the improvement of the Provincial Weed Act. I believe one of the strongest suggestions made was that regarding a campaign of education. I think the Dominion Seed Act would be of very little importance were it not for the fact that a great deal of instruction has been given in respect to this Act; at almost every seed meeting the Dominion Seed Branch have had speakers. It has been discussed and re-discussed, and the details explained in the simplest manner, with the result that over the Province of Ontario the farmers have a fairly clear idea of what the "Canadian Seed Control Act" means. In some respects the Provincial Act is more strict than the Dominion Act.

Now, the Dominion Seed Act divides the clover into three classes: No. 1, 2, and 3, and No. 3 is sold with a weed content of 400 to the ounce. The Provincial Act states that the seed shall be practically pure. Now, I know I am safe in saying that there is not one farmer in the Province of Ontario who thoroughly understands that Act; therefore, I agree with Prof. Howitt, that this Act should be presented to the farmers of this Province, to all Farmers' Clubs, and to the Agricultural Press for educational purposes.

The second point is the recommendation for the appointment of an inspector living outside the district to be inspected; and, the third point, an inspector to look after the inspectors. If you have heard the report you will notice that in a great many cases the work was not reported. I think it is the duty of some person to report the work done by the inspector, and to see that the work is carried out properly. I believe that the council, or the Department of Agriculture, or whoever is responsible for these men, should be very careful in the choice of inspectors. In my experience, and that is a short one, I have found there is a great difference in weed inspectors. We need men that know the weeds and also know the seeds, but we also need men of ability who will be able to talk to and educate the farmers in the details of the Acts, before they endeavor to enforce the law. If men of this kind were employed I believe it would save a great deal of trouble and would assist materially in the educational campaign. I have also noted that there is an increase in the number of noxious weeds. I may say I do not believe that the average county council is competent in all cases to enumerate the number and kind of weeds that shall be called noxious. We have known cases where a local council prosecuted men for growing certain weeds, and on inspection we found that these weeds were quite prevalent throughout the whole township, and that other men were just as liable for growing them.

The Act does not require a great deal of change. With the three changes suggested, I believe the Provincial Act would be quite beneficial to the Province of Ontario. After all, the main idea is to keep the worst places, the roadsides and the railway strips, clear of weeds.

Our President referred a moment ago to the question of sheep on the road-

side, which, after all, is a very important question. Where fences are still in existence, especially the older rail ones, sheep might be allowed to pasture on the roadside, and if they were, these roadsides would be kept comparatively free from weeds. I believe that the weed seeds developed on the roadside are going through the whole country, and it would be better if we would encourage the pasturing of sheep on the roadside instead of requiring them to be shut off the road entirely. If that is not done then it is up to the roadmaster to see that the road is kept clean. We should not make any distinction as to what kind of weed is on the roadside.

Let me make one more suggestion in connection with impurities which are found in grain which is sown on the average farm. I made a statement yesterday that a very small percentage of the farmers of the Province of Ontario realize the importance of clean seed, and that there is quite a percentage of the farmers of Ontario, where, through lack of knowledge, the farmers do not even know what the impurities are.

We have in the Province of Ontario two associations that are making the attempt to advertise farmers who have relatively clean seed, for the purpose of assisting men who want clean seed to get it. This will help to overcome the difficulty of marketing pure seed. There is plenty of clean seed in the Province of Ontario to-day, but the trouble is that farmers of this Province, for the sake of saving 25 cents a bushel, will refuse to buy what they know is absolutely pure seed. It should be our ambition to sow cleaner seed all through Canada than is being sown at the present time.

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## REPORT OF COMMITTEE ON THE PREVENTION OF THE IMPORTATION AND THE DISTRIBUTION OF NOXIOUS WEED SEEDS IN GRAINS AND SCREENINGS.

J. R. Dymond, Seed Laboratory, Ottawa.

A year ago I prepared a paper which was read before this Union, giving the composition and uses of elevator screenings. During the past year over 60,000 tons of cleanings were taken from western grain at the terminal elevators at Fort William and Port Arthur; of this quantity over 50,000 tons were exported to the United States and less than 10,000 tons came into Ontario and Eastern Canada. The quantity coming into Ontario is increasing rapidly from year to year.

Elevator screenings contain, besides shrunken and broken kernels of wheat, oats, barley and flax, varying proportions of all the weed seeds which grow in the grain of Western Canada. Wild buckwheat, lamb's quarters and wild oats occur in greatest number. Of the mustard family there are wild mustard, hare's-ear mustard, ball mustard, stinkweed, tumbling mustard, wormseed mustard, western and round-seeded false flax, common peppergrass and the wall flowers. Besides these there are 25 or 30 other seeds, many of which belong to our most dangerous and destructive weeds. It is, therefore, apparent that there is great danger of introducing and spreading noxious weeds through the careless handling or improper use of such material.

The screenings which come into Ontario are mixed with other grains and ground by ordinary choppers, but the ordinary chopper is entirely unsuited to

crush the fine seeds found in such large numbers in all screenings. This is shown by the analysis of a sample which had been ground in order to put it on the market as a feed. One-eighth of an ounce contained the following weed seeds:

*Noxious.* Tumbling mustard, 215; western false flax, 8; wild mustard, 2; hare's-ear mustard, 2; stinkweed, 2; small-seeded false flax, 1; stickseed, 1; catchfly, 1; perennial sow thistle 1.

*Others.* Lamb's quarters, 460; cinquefoil, 7; green foxtail, 6; timothy, 3; wormseed, 3; plantain, 1; evening primrose, 1; yarrow, 1; tickseed, 1; western wallflower, 1.

This is equivalent to 29,800 noxious weed seeds and nearly 62,000 others per pound. This is an entirely wrong use of elevator screenings and one that is apt to bring about the wholesale spread of noxious weeds.

But a large proportion of elevator screenings is of good feeding value. Besides the small and broken kernels of wheat, oats, barley and flax, the large numbers of wild oats and wild buckwheat make good feed when properly ground. The American feeders and feed manufacturers imported last year 50,000 tons of our screenings against an ad valorem duty of 10 per cent. and freight charges to Chicago and Buffalo by lake and often considerable distances inland by rail. The finished product in the shape of dairy and poultry feeds and even mutton and eggs are returned to Canada against more freight and duty charges. Last year we imported from the United States over 13,000,000 dozen eggs costing more than $2,500,000 and more than four million pounds of mutton, and lamb valued at $439,000. I do not forget that the committee for which I am reporting aims at the prevention of the importation into Ontario of noxious weed seeds in screenings, and you will gather that I am in favor of having more of it come into Ontario. I am, but I am thoroughly convinced that we can use, if not all of it, a large part of it profitably and with less danger of spreading noxious weeds than is incurred by the use of the small quantity we now receive.

Our problem is to find out how these screenings should be fed. You can easily understand that a chopped feed made by grinding up the entire screenings would not be relished by all kinds of stock. Some of you know how disagreeable worm seed and others of the mustards taste and that hogs refuse to eat chop made from grain containing any appreciable quantity of these seeds. The same difficulty is met in the use of ground screenings. A man who buys a quantity of screenings for cattle or hog feed naturally tries to include it all and is willing to mix in some good grain to cover up the bad taste of the mustards. In the United States these fine seeds are never ground with the rest of the screenings but are separated and made into dairy and other feeds which usually contain molasses and often such materials as cottonseed meal, linseed meal, bran or shorts. There is little demand in Canada for feeds of this kind and the easiest way to use the small seeds is to leave them in the screenings and grind them all up together. Whether the inclusion of these adds anything of value or whether their removal would improve the feed is something which should be settled by careful feeding experiments. If the entire screenings are to be ground up together, a perplex grinder or attrition mill, or a combination of the two, must be used to thoroughly pulverize the weed seeds. These machines require a great deal of power to operate and this adds considerable to the cost.

In the analysis of the feed I gave a moment ago, you will notice that more than 95 per cent. of the weed seeds are tumbling mustard and lamb's quarters.

Tumbling mustard seed is so tiny that it readily passes through a fine mesh wire sieve containing more than 30 wires to the inch each way. The seed of lamb's quarters is larger but has a hard flinty coat which makes it difficult to grind, and ordinary elevator screenings contain about 20 per cent. of this seed.

By careful recleaning over a one-fourteenth inch perforated zinc screen, practically all the lamb's quarters and smaller seeds, including tumbling mustard, wormseed mustard, stinkweed and many others, are removed. This leaves a material which can be ground by ordinary choppers and its palatability is much improved, I believe, by the removal of the bitter mustards. I think I am safe in saying that if the 50,000 or 60,000 tons of cleanings annually taken out of our western grain were recleaned to remove the small seeds and carefully ground, they could be profitably used in feeding hogs and cattle with far less danger of spreading weeds than by the use of commercial feed grain. It may be that these fine black seeds can be fed to sheep; but we can not allow them to be shipped in an unground state and their value as sheep feed may not be sufficient to make it profitable to grind them as finely as is necessary to remove the danger of spreading weeds.

Wild buckwheat is the commonest impurity in Canadian grain and forms from 10 per cent. to 15 per cent. of ordinary screenings. This is one of the largest weed seeds and is not removed by the screen I mentioned above, but it is good feed and is easily crushed. However, we believe that if wild buckwheat were separated it would be more valuable as poultry feed than high grade wheat and corn. Mr. Elford did some feeding work with this seed last winter at the Central Experimental Farm, Ottawa, and is enthusiastic over the possibility of using buckwheat screenings instead of much of the higher priced poultry feed now in use. This seed is best separated by a screen with triangular perforations which also takes out a good deal of cracked and shrunken wheat, a little barley, oats and flax, some wild oats, wild mustard, hare's-ear mustard, and a few other seeds. Further experiments on the value of this material as a poultry feed are in progress at the Central Experimental Farm. There is a good market for wild mustard seed, and where any attempt is made to reclean screenings at all this is taken out and sells for enough to pay many times for its separation.

Last year I outlined the uses to which elevator screenings are put in the United States. Since then I have given some attention to the attempts made in this country to use them as feed. Without reliable information based on feeding experiments on the value of the various constituents as a feed for different kinds of stock, we are not in a position to recommend any federal or provincial regulations as to their disposal, but I think I can suggest a method of handling them that will incur little danger of introducing or spreading noxious weeds.

The screenings should be carefully recleaned over a 1/13 or 1/14 inch perforated zinc screen to remove the fine black seeds. This will mean a waste of from 35 per cent. to 40 per cent., made up approximately of 50 per cent. lamb's quarters, 12 per cent. to 15 per cent. mustards, 9 or 10 per cent. other weed seeds, and 25 per cent. or 30 per cent. fine dust. This may be of value in the United States where large quantities of such material are pulverized and used in the manufacture of molasses feeds. The remainder should be further recleaned to remove the buckwheat screenings for use as poultry feed. The wild mustards may be separated and exported for making oil.

This will leave 45 per cent. or 50 per cent., made up of 60 per cent. or 70

per cent. shrunken wheat, 25 per cent. other grains and less than 5 per cent. weed seeds, mostly wild oats and wild buckwheat. By careful grinding in ordinary choppers the vitality of practically every seed in this will be destroyed and the product can be fed with little danger of spreading weed seeds.

We receive a good many letters from farmers complaining of the death or sickness of stock following the feeding of shorts, bran, molasses meals and stock foods containing screenings. Here is one that came in yesterday morning.

"At the request of Prof. J. E. Howitt, Guelph, I am sending you a sample of a molasses meal feed for a complete analysis, and kindly report to me at your earliest convenience.

A horse I was feeding it to commenced to fail and died within two weeks in great pain, though otherwise we could locate nothing the matter with him. Another horse scoured violently and so did a cow, so I have stopped feeding it entirely.

It is about time the government took active measures against all these unscrupulous feed dealers who are charging the farmer outrageous prices for mill feeds composed of quantities of weed seeds which are injuring and killing the animals they are fed to. I paid $1.75 a hundred for this feed and I have been a month up day and night with sick stock which I believe was caused through nothing else but this feed."

The molasses feed referred to contains lamb's quarters, wild buckwheat, chickweed, plantain and fragments of many other weed seeds. We suspect that elevator screenings, besides spreading weed seeds, are capable of causing serious injury to the health of stock. Feed manufacturers will not admit that results described in such letters as this are caused by screenings. They say you can kill an animal on any feed, and that it is not right to condemn a feed as poisonous or injurious just because a farmer loses a horse or a cow that has been fed on it.

There is a right and a wrong use of everything, but whether the right use of such material as the fine black seeds in elevator screenings is as a feed for horses, cattle, sheep or pigs has never been shown. It is surely time that some one interested in feeding animals gave us some information on this point.

Until we can say what should and what should not be done with screenings and back up our statements with conclusive evidence, we can not frame federal or provincial legislation to regulate its use.

PROF. HOWITT: I want to confirm what has been said in regard to the unwholesomeness of patent food. We have had numbers of letters on this matter which certainly need investigation at the present time. These letters are generally sent to Prof. Harcourt, and then they are sent over to the weed seed section. In the various samples of Molasses Food we found traces of broken Mustard seed, as well as other seeds reported.

PROF. HARCOURT: I would like to add that I think I have had at least ten or twelve samples this fall of mill feeds of various kinds coming in from different sources, telling how injurious they were to stock, and one man stated that he had lost one hundred hogs. I always get rid of it by passing it over to the Botanical Department. I know they can treat it better than I could in my chemical analysis. It shows exactly the position we are in. We do not know a great deal about how poisonous many of the seeds are. We can find out something about how many of the various seeds are in the mixture, but how poisonous the various seeds are we cannot find out. It does seem as if there was a considerable amount of valuable food in these weed seeds. Some of them have so much oil in them that they are very hard to grind fine. If we could find out what ones are poisonous and remove them that would be valuable information.

MR. T. H. MASON: Before we can ask for Federal Legislation we must know where we are. There is room for experimental work.

MR. DYMOND: In the first place the weed seeds are so finely ground, in some cases, that it is hard to separate the seeds in the feed, and if you do find certain weed seeds it requires a considerable number of operations to locate those which are poisonous. It is very difficult to carry out experiments with stock.

MR. T. H. MASON: That is experimenting with seeds after they are ground but we should begin in the separation process.

MR. DYMOND: Last spring we got a carload of screenings from Fort William screenings from three different elevators and three of the largest elevators. In that way we thought we would get fair samples of screenings. Of those which we separated we had some ground under natural conditions, then we had them ground with flax seed, and we had some good big weed screenings taken out and ground up These are now being fed at the Experimental Farm to hogs, cattle, and sheep They are using different patent molasses foods, also shorts, with them. In order to arrive at a satisfactory conclusion you must have a great number of animals and a great deal of material, and for many of these operations the Central Experimental Farm is not in a position to undertake the experiments. We would like to stimulate a little interest among the Ontario feeders along this line, especially as that material is coming down here in larger quantities every year. It is mostly secured from Port Arthur and Fort William, and is of special interest to the Province of Ontario.

MR. T. H. MASON: I understand the speaker to say that they paid as high as $20 a ton for Mustard seed for soap manufacturing purposes. That is a very good price to pay for Mustard seed, and it seems to me that there are portions of the Province of Ontario where Mustard growing might be a lucrative industry.

MR. DYMOND: The grain growers sold a carload of mustard seed to a concern in Philadelphia, and I understand that was the price paid for it, $20.

PROF. ZAVITZ: When these questions came before the Experimental Union some years ago, it was thought advisable to have a committee. A committee was appointed, I think, some four years ago when the Hon. Sydney Fisher was here. He heard the discussion at that meeting, and he said he would do what he could. He started the work, and it is from that beginning the Dominion Government are continuing. It is a big problem to solve, but I believe some good work is being done. When the report was read last year we had Mr. Dymond at the meeting. He has been doing great work, and we have added his name to the Committee. I think from the discussion that has taken place to-day, and the results that have been reported, that there is still a great field of operation open for that Committee. This committee was appointed by the Association, and I think this is a good time for me to move this resolution; "That that committee be continued as it is now constituted." Carried.

A MEMBER: It should be the business of this Committee to make the manufacturers responsible for the poisonous matter in these foods. I know of several instances where cattle have been killed in my part of the country.

PROF. HARCOURT: While there is no justification for the poisons being there it would probably be a very difficult matter to prove. Possibly, if we were in touch with the pharmacy men we might get at these points more readily than we are doing. I do not know, but I think we would have some difficulty in getting legislation of that kind passed. We have got some legislation in connection with weed seeds, but this question has been side-tracked entirely in the legislation we have. Bran, according to the Food Stuffs Act, the original Act, could be sold without being stamped as to its composition; now, there is a rider added to that to the effect that bran cannot be sold without its composition being put on the bags. If

there are weed seeds in it the millers at once stamp the weeds and bran with the composition, and in that way they go on selling weed seeds. It just gives a little more trouble to the miller to stamp his middlings and bran. It seems to me we would have to get at the problem by the actual study of weed seeds, and their problems in the West. By feeding we can show whether there is anything injurious in these weeds. There was a time when Alfalfa was supposed to be a very bad thing to feed. Many people have had stock die on account of feeding them entirely on alfalfa. It is quite possible we will find a use for a number of these weed seeds, and they are in such quantities, and will come along in greater quantities from the West, but whether the responsibility can be put on the manufacturer at the present time or not I do not know.

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## CANADA'S CHANCE IN HEAVY HORSE BREEDING.

Dr. F. C. Grenside, Guelph.

It is just twenty-three years ago since I sat on this platform. At that time was asked to discuss the question of light horse breeding; this time, after a apse of twenty-three years, I have had the honor of being asked to discuss the uestion of the heavy horse market as it presents itself to us to-day. The Board f Control of the Experimental Union evidently felt some anxiety on the subject, nd for that reason they have put it upon your programme for discussion. I think ney should feel some solicitude in regard to this question, from the fact that we ave seen a drop of from $50 to $75 per head in the heavy horse market. Now, your object, as I take it, in bringing forward this discussion is that every advantage, circumstance and condition which will tend to throw any light upon the subject, as well as upon every feature of the heavy horse trade in this country, ay be brought forward and discussed.

In taking up the question I think it is very important that we go more oroughly into the history of heavy horse breeding in our country. We will run over very briefly the history of heavy horse breeding in this country for the last rty years. The history of heavy horse breeding for the last forty or forty-five years has been one of ups and downs. First, in the seventies, we had the downs; the eighties we had the ups; we had some ups in the nineties, and also some owns; and then, for the last ten years in this country we have had a very pro- unced upward tendency. Now you see the history of heavy horse breeding has assumed a sort of circular shape; there have been periods of depression, periods of very good prices, and they have alternated. In the year 1870, a good farm horse ould be purchased for $100, but exceptionally well bred horses would bring as uch as $140 to $150. As we get towards the end of the seventies, another factor ntered into the heavy horse breeding. At that time the Americans had the idea hat they could do their work more economically with a heavier class of horse than they had been using. Prior to that time they had been using a light draft horse over in the States for draft work; they were not using a heavy draft horse but to a very limited extent. They conceived the idea that it would be to their advantage to use a heavier grade of horse, and they naturally turned to Ontario because it was close at hand and there was a good supply here. They bought freely in our market, purchasing some geldings, but chiefly mares. This raised the price of heavy geldings $25, and mares possibly $50, in two or three years. They main-

tained that price with varying vicissitudes all through the eighties. Farmers were encouraged to breed on account of the very fair price they were getting for their stock, and they did breed. Importers imported very freely, and there was a tremendous business done in heavy horse breeding during that period. A very broad change, however, came after the panic in 1893. Horses dropped $100 in one night. That was one of the most severe panics we ever had on the continent. I was in New York at the time, but I think it was some months or possibly a year before it was felt to its full extent in Canada. This depression continued and we did not get over it for years. The low prices of heavy horses affected the light horse breeding, and one could hardly give a horse away. The conditions were most discouraging, and many of the breeders stopped breeding. Many of the importing dealers were ruined. The trade was exceedingly bad during the remainder of the nineties. In order to relieve the great stagnation in this country dealers looked to other parts of the world for a market, and they began to ship abroad. Notwithstanding the high cost of transportation they were enabled to buy here and sell at a slight profit, as they were able to buy at a very low price. A tremendous shipping trade was conducted in this country through the nineties until the end of that period when horses began to take a slight rise again. As prices became higher they ceased exporting them to the same extent; and gradually the exporting trade dwindled down until they gave it up altogether.

We come to the next ten years, the next cycle, and we saw this: the highest prices that have ever been obtained for heavy horse flesh on this Continent. Horses were exceedingly high, in fact they were almost too high for the consumer, but breeders seemed very well satisfied with what they were getting, and breeding went on apace. There was lots of breeding up to about two years ago when we found another change. Horses began to decline for reasons which we will consider a little later. Now, as I said in beginning this subject, it is as well to take advantage of all the knowledge we can obtain to get the correct view of the business of the heavy horse trade. There are several factors which have a very important influence in determining the price of heavy horses; one factor is, and the general principle applies at all times whether horses are low or high, that the general trade conditions of the country make a good deal of difference in the value of a horse. When you find trade conditions in big undertakings going forward then there is always a demand for horses, and prices increase. You will notice that two years ago, when trade began to decline, the prices of horses began immediately to decline. We may expect that as a general rule. Whether trade is bad or trade is good the prices fall or rise immediately. We have other factors which come in, very often unperceived, that have a very marked influence upon the horse market. We cannot tell when there is going to be a strike or a tie up, and that may have a very important influence. One factor which I have already mentioned, is the demand from the United States. No person foresaw that. During the seventies, trade conditions were very bad in this country; there was no extension or development one might say, and the prices of horses as I have already stated were low, but when the Americans came over here and began to buy freely and largely, the prices at once went up and horse trading became remunerative to the producer. As I said before, the farmers bred very freely, indeed; there were large importations and a tremendous number of horses produced. This market almost became glutted with horses, so when that panic came in 1893, it found a tremendous supply of horses on the market, and no market for them. That was an extraordinary kind of factor. Now, during that period, there was more or less buying from the Northwest, very limited in extent when compared with what has taken place during

the last ten or twelve years. That helped out the market to some extent, and during the last decade the Northwest has had a very important influence upon the horse market. Now the Northwest settlement was a very important factor, indeed, but the question is: have we done with that factor? I am rather inclined to think we have; I do not think we will have much more importing on the part of the North-west from Ontario of heavy horses. They are breeding rapidly there, but the demand has ceased in the meantime, as settlement is not going on so rapidly as some years ago. They are breeding quickly enough for their own needs, and consequently are very unlikely to come into this country to purchase horses, so that we cannot look forward to the North-west as a market in the future.

Many people believe that immediately succeeding the war there will be a very broad and sharp revival of the heavy horse business, and I thought at first myself that this might be so; but many of those larger undertakings of the past, such as the building of the Canadian Northern and the Transcontinental, and other large contracts, which consumed an enormous number of horses, are nearing completion. Although there may be a revival, and smaller undertakings of a like nature, I do not think it will affect very rapidly the price of heavy horses in the way of raising them. I am inclined to think that for some years to come we will not see anything like the prices we have experienced during the last ten years, in fact, we might possibly experience a slight decline. I was talking to a gentleman yesterday in Toronto, and asked him what he thought the decline would be, and he immediately said $75. I put it at $50, which is a very serious decline, and sufficient to give us every reason to pause and think what the future of this trade is going to be.

Now, another factor which has been very frequently referred to, and which comes to every person's mind in connection with this business, is the motor truck; as to how much influence it is going to have on the future consumption of heavy horses. We possibly think we have felt no material influence from it so far. In some of the large eastern cities of the States motor trucks are being used very largely and they displace a good many horses, but I do not think that they have had any material influence upon the price of heavy horses. I do not look forward to a very pronounced effect from the advent of the motor trucks into the draft business in Canada. It may have a certain amount of influence, but I do not think it will be very widely spread. Motor trucks are suitable for certain purposes; they are better than horses sometimes, for instance, in large cities where the roads are good for long hauls they are much better than horses, as bigger loads can be taken at a faster pace. For short trips, however, where there is much twisting and turning and backing I think the horse is ahead of the motor truck. For most kinds of work, where the roads are uncertain, and where the weather is uncertain, I question whether the motor trucks are going to have a very great influence upon the demand for heavy horses.

Now the question is—having considered all these points which influence the price of horseflesh—are they likely to influence the price of heavy horseflesh in the future? I think a breeder ought to consider very carefully before he ceases breeding. My recommendation would be to go on breeding draft horses, but to do so very cautiously. If you have a doubtful mare, one that you think is a questionable producer of the larger class of stock, I would not breed; but if I had a good mare, and the evidence showed me she was likely to be a good producer, even if she had never produced, I would go ahead and breed her. I think there is a future for the heavy horse trade. You will find a greater advance than we have seen in the price for the last two years. I do not think we have struck bottom yet, but

you never meet with a down but what you find an up. It puts me in mind of an old Wilmington merchant, who was also a specialist in consoling horse dealers. I met him at a time when a storm had been raging for two or three days. I said: Well, Mr. Weldon, do you think it is going to clear up? "Well," he said, "it always has." I think the clouds will clear away in the horse trade, but not in the immediate future.

A MEMBER: What do you think are the prospects for the light horse trade?

DR. GRENSIDE: Well, it is pretty good just at present, if you happen to have any good ones for sale. I saw yesterday in the papers that the officers were denouncing in no uncertain terms the stock gathered from Toronto, and the buyers are sending the best to the officers. They are a poor grade of horses, and not up to the requirements. I think we would have done very much better had we introduced thoroughbred blood. They cross well with any sort of breed, and not only that, but there is a good chance of them developing something good. I do not mean to say that it would suit everybody to go into light horse breeding. There are many farms which are not suited for light horses at all, and the farmers have no aptitude for handling them. If they have I think it is a good plan for them to breed this class of horse. The war has had a very radical effect upon the market for light horses, and for horses for light purposes. One can sell horses of that class all over the world. There is a good demand from foreign countries as well as the demand in this country.

A MEMBER: What about the artillery horse?

DR. GRENSIDE: They do not seem to be very numerous here either. This is not a light draft horse, at least that is not my conception of an artillery horse. He must be active and still weigh from 1,150 to 1,200 pounds. Of course the heavy thoroughbred horse is the best for that purpose, and they can be raised in this country with proper breeding. There is also a sale for this kind of horse outside of the army demands. It is a type which resembles that of the carriage horse.

A MEMBER: What will they do with these horses after the war is over; and what will be the condition of the market?

DR. GRENSIDE: Pretty good. I think the armies of Europe will be in the market for horses, as there will not likely be any producing in Europe for some time.

A MEMBER: What kind of horses do you recommend being bred for foreign use?

DR. GRENSIDE: I believe in breeding a thoroughbred sire with a mare of some warm blood, and a great deal of toughness. Do not breed weeds.

A MEMBER: What will be the possibilities for the agricultural horse in these countries which are now at war after hostilities cease?

DR. GRENSIDE: I think there will be more or less demand, but I question whether they will pay our prices for horses for agricultural purposes over there. There will be a demand for horses, but transportation, and other costs will put about $30 on the agricultural horse, with insurance, etc.

A MEMBER: What do you think is a good farm horse, for general farm work?

DR. GRENSIDE: They are not a high priced horse as a rule, weighing about 1,200 pounds.

A MEMBER: Why would you cross a thoroughbred with grade mares having some working blood in them?

DR. GRENSIDE: I do not mean draft mares. We have lots of that breed, but coach bred mares, and hackney bred mares. They have size and substance enough to produce a good size with a thoroughbred. I have seen good results from crossing light draft with thoroughbred sires, but I would not recommend it.

A MEMBER: Do you think it is a good thing to mix the breed?

DR. GRENSIDE: No, I do not think so.

A MEMBER: Is it all right to breed a thoroughbred with a hackney?

DR. GRENSIDE: Yes, there is no better cross for the ordinary delivery horse. You will not get exactly a race horse, but you will get a useful horse with substance, activity and size, and stock suitable for good higher priced delivery horses are produced in this way. It would not do to take any sort of mare you have, as I said some time ago, but use judgment in the selection.

A MEMBER: Where you cross a pure-bred hackney with a thoroughbred sire of another breed would it not deteriorate the stock in the cross?

DR. GRENSIDE: Yes, it just depends upon what you want them for. You mean a pure-bred hackney?

A MEMBER: Yes.

DR. GRENSIDE: If you have a pure-bred hackney mare you should leave her for a pure-bred hackney sire, but if you have one or two crosses of hackney, then by breeding to a pure-bred sire you breed up; that is what I was referring to. If I had a good hackney mare I would breed her to a good hackney stallion, but where you have one-half or three-quarters, I think it is a wise plan to breed to a thoroughbred horse if you want to get a good active saddle horse.

A MEMBER: What does it cost to get hackney mares registered?

DR. GRENSIDE: That varies with different stock associations.

MR. MONTEITH: I thank Dr. Grenside for the thorough way in which he has treated this subject of heavy horse markets, and while I agree with most of what he has said I do not feel exactly like agreeing with him as to the future markets for heavy horses. It seems to me that prospects are fair for the heavy draft horse, and I think that in the North-west there is bound to be a demand for heavy horses. He treated the question thoroughly and pointed out that they were breeding heavy horses there themselves, but certainly horse breeding in the North-west has been somewhat disappointing. Not only that, but in Ontario it seems to me that we are going to increase our production of heavy horses, because there is going to be a good demand; for the heavy horse, after all, is the horse which we depend on for tillage and other lines of production. Coming as I do from a heavy horse district we feel that, with the advice which Dr. Grenside has given us, with careful selection and breeding from the best we can get, there is no reason for our being pessimistic at all about the outlook. Prices have been very high, and consequently when they dropped many people thought they were losing money, but the breeder was not. At prsent prices, which I believe are going to be maintained, there is bound to be a heavy draft upon our light horses which will have to be replaced with our heavy draft. I think the Doctor looks at the future a little pessimistically. I believe it is a safe business to follow up, if we exercise an equal amount of skill.

DR. GRENSIDE: You possibly misunderstood me a little. I recommended them to keep on breeding. Probably the one point we differ on is: Are present prices going to be maintained?

MR. MONTEITH: Yes.

DR. GRENSIDE: But there is no market for them at the present time.

MR. MONTEITH: I know that farmers are buying.

DR. GRENSIDE: Well, there may be some trade among the farmers who have lots of money. In my opinion I would look for a market in heavy horses when we have had ten years elapse.

A Member: This is not a country which is going to be laid waste; the manufacturers for their heavy horses will have to come here. This country has practically all its development ahead of it. I am a little doubtful about the breeder at present; I am a breeder myself, but am not going at it very strong just now.

Mr. T. H. Mason: This question is one of practical importance. I remember very well the depression which occurred in the land some years ago; at that time I was loaded up pretty well with horses, and it just looked to me as if the whole country had stopped breeding. Every person got cold feet. I sized up the situation something like this: we should apply the principle of ten years up and down, because after all we must not lose sight of the fact that horses, apart from other demands, are 75 per cent. used on the farms of this country. That industry is here to stay. So I say that although I expect a tremendous increase in horse production we must be prepared to take the ups with the downs. With regard to the demand from the North-west, I think Dr. Grenside has certainly impressed upon us the fact that the market of the West is a matter of the past. I do not know of any better horses than those in Saskatchewan. They have both the food and the climate to produce horses; there is no better country in the world for this purpose. I think they will be quite able to take care of any demands for horseflesh from that part of the country for many years to come. The demands of Ontario should not be lost sight of. Reject all your doubtful mares. The man who has really good quality in his mares, no matter whether heavy or light, may, in my opinion, stay with the business, and sooner or later good prices will return. Just as sure as light follows darkness you are sure to have a demand for all horseflesh of that kind. You can always sell them.

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## BEAN GROWING IN ONTARIO.

J. O. Laird, Blenheim.

I think I have a rather difficult task in addressing you, as Prof. Zavitz has just given us the results of the experiments on the different crops throughout the Province. However, I have one satisfaction, and that is that while there may be some here acquainted with bean growing, there are a great many who are not, so, if I make a few mistakes I hope I may have your pardon. My remarks apply to bean growing in the bean growing section of Ontario. I believe that the bean section of Ontario, and the reports go to show it, can be and is extending to different parts of the Province. Now, the bean plant, as you know, is of the legume family, and is one of a number of members of that family which have a very high food value, both for men and for animals. In Ontario, beans have been grown for probably more than half a century. As near as I can find out it was in the year 1857 they were brought into Kent County. The variety of beans grown then was not the same as the variety grown now; we are now growing a variety which is known as "the Pea Bean." This variety has been grown in Ontario for probably thirty-five or forty years. Last year there were about 50,000 acres of beans grown in the Province of Ontario, about half of them, or 23,000 acres, were grown in the County of Kent. Other counties were growing considerable quantities. In Huron County there were 7,000 acres, in Elgin

County about 5,000 acres, and the remainder of the 50,000 acres was distributed fairly evenly among the farmers in the counties all over the Province. All this goes to show that bean growing need not be confined altogether to the peninsula in the south-west of Ontario; they do well in most of the counties of Ontario. The land, both in Canada and in the United States which appears to be most suitable for bean culture is the land which is fairly rich in potash, phosphoric acid, and organic material. In the bean section of Ontario, the soil in most fields—that is where beans have been grown to great extent—is a rather dark loam. This is found in that portion of land lying around the shores of Lake Erie and in the counties mentioned. But, although this has been land we think most useful for bean growing, we found that beans will do well even on a rather heavy clay soil, provided it is well underdrained. Recently, of course, we have all come to the conclusion that we must underdrain for any crop to get the best results. Now the best preparation of a heavy soil is obtained, I think, by ploughing in the fall, while, with the lighter soil, spring ploughing is often practiced. I might say that there is some objection to putting manure on the land which is going to be immediately sown with beans; applying it with oats or barley might be more profitable. The practice has been to manure ploughed land; ploughing in the fall on heavy clay, and on a light soil ploughing as early as possible in the spring. One of the most important things in bean culture, after the land is ploughed, is to roll it down as quickly as possible in order to maintain the soil moisture, and after allowing it to be disced and harrowed over, the cultivation should be continued during the months of April and May, in order to kill all the weeds possible and to retain the soil moisture, and get the land in a good state of tilth. The preparation of the soil is practically the same for fall and spring ploughing, that is up to the planting time. Kill as many weeds as possible. The beans are planted from the 28th of May until the 15th of June, and even later. It is most important to try to get the seed pure and as uniform as possible in size. Such seeds as we have known to give good results in the past. It is difficult, I believe, to distinguish the absolutely pure seeds, seeds entirely free from disease and other varieties.

The former method of planting beans was to use a bean planter, and plant them two rows at a time and two beans in a hill, but of late years the grain drill has come pretty generally into use. We block up all the spouts but three, making them an equal distance apart in the rows, and making the rows twenty-eight inches apart. We use about three pecks to a bushel of seed for sowing an acre, so you see that it would not be a great deal of trouble to hand-pick enough to sow even fifteen or twenty acres.

Cultivation is a very important matter, as it is with most of our crops. This usually begins soon after the beans are planted; in the course of two or three days we run over them with a harrow. Beans germinate rather quickly, and we have found our favorite beans are often up in from four to six days. Of course, it would not be safe to harrow when they are above the ground until they have made considerable growth. After they are up and appear to be large enough to be cultivated with a horse cultivator, we often run over them with a weeder. After the beans are large enough always use your two horse cultivator. I expect some of these gentlemen growing corn use the share on the two horse cultivator. To use these shares on the cultivator and put them on right is a very important factor. I find the best way is to leave them just a little above the ground, so that when the cultivator is under, the share is just slightly over the ground.

Cultivation is continued, of course, during the season every ten days or two weeks, or after every shower of rain. The cultivation should not be continued after the beans are in blossom, as you will find the cultivator is rather heavy and will knock the blossoms off. If the cultivation is thorough up to blossoming time beans should not require any cultivation after that.

The harvesting of the bean crop used to be done by hand, but now we use the bean puller. This is attached to the cultivator; simply take off the apparatus that does the cultivating and place on the frame two knives which run in a "V" shape. This pulls two rows at a time, and is a very simple method for harvesting ten or twelve acres of beans per day.

A MEMBER: That must be hard on the knives; how do you keep them sharp?

MR. LAIRD: Get a good big file, and after you have cut six or seven acres, take the knives off and give them a good sharpening with the file. I used to have them drawn out by the blacksmith, but they raised their prices so I found it cheaper to get a big file and do the work myself.

A MEMBER: What cultivator has this attachment?

MR. LAIRD: The Gill people have a bean puller attachment.

A MEMBER: Is it on the Gill cultivator?

MR. LAIRD: Yes, there is also another American cultivator that has an attachment for it.

A MEMBER: Where are their headquarters?

MR. LAIRD: The Gill people are somewhere in Michigan, and the American Cultivator people are somewhere in Missouri.

A MEMBER: Are they commonly used?

MR. LAIRD: Yes, in our portion of the country. Nearly everyone has one or other of these machines.

A MEMBER: Do the Massey-Harris people manufacture a cultivator with a bean puller attachment? If they do we should buy "made in Canada goods."

MR. LAIRD: I think there is a Canadian bean puller. Two rows are pulled at a time, and we use a side delivery rake to bundle or rake the beans up. With a side delivery rake you can go along and gather up three rows. The side delivery rake will do a good job and take the dirt out pretty well. After the beans are raked and pulled they should be left to dry in the ordinary way for three or four days, and after that they should be turned over again either by hand or with the side delivery rake and left, perhaps for another day or two days, then under ordinary conditions they should be ready to draw into the barn. Beans are rather hard to harvest if the weather is wet. We find the side delivery rake to be a great help in wet seasons. It is very important to have the beans dry before you put them in the barn.

A MEMBER: Has the yield been satisfactory?

MR. LAIRD: I might say the yield this year, as is the case with most other crops, has varied considerably. I have known beans this year that have gone as high as 35 bushels to the acre and other crops yielding as low as 30 bushels to the acre. I will not say that it is as easy to grow a big crop as it is to grow a small crop.

The threshing of beans cannot be done by the ordinary threshing machine; it splits too many; it is done by a machine specially constructed for that purpose. The first cylinder runs slowly and the next a little faster. Bean straw is quite an important feed for sheep or cattle. We make a practice of keeping the bean straw always in the barn. We find it saves better and is a valuable food.

The markets for the Ontario grown beans are mostly in the Dominion. Most of the crop is sold in the eastern provinces, and in the Canadian West, and I believe a few carloads may be shipped to Chicago, or some other point in the States. We have not been able to supply the home demand for many years, and the price has been set by the foreign bean dealer. We have always imported beans from foreign countries into Canada. This year we will not receive any foreign beans, nor will we next year, and I believe this is one reason why we, as farmers, should try next year, and in the years to follow, to grow as large an acreage of beans as we possibly can. Beans are a concentrated food, and contain a small amount of moisture. A carload of beans will make a tremendous amount of food. They are one of the easiest crops to export, and there never was a time in the history of Ontario more favorable for starting in the bean growing business. In every part of the Province, those of us who are growing beans can extend our acreage, and we can grow more this coming year than we have ever grown before. The beans grown in my locality have, during the last eleven years, been sold by what is known as the Kent Farmers' Produce Company, with headquarters at Blenheim, Ontario. This company was formed eleven years ago and has been doing business since that time. We have had a lot of experimenting to do, but we found that the organization has been of very great benefit to the farmers, not only in the way of finding a bean market, but in many other ways—in helping secure good seed, etc. This year we were enabled to pay a dividend of seven per cent.

It is very important for us to consider how best we can increase the supply of beans, and how we can produce the very best beans possible. Not so much work has been done along the line of bean culture as has been done along some other lines. No doubt it would be of advantage to us to do some seed selection work. I believe work should be done by us, as has been done at the college here at Guelph, to secure good bean seeds; beans that will produce a large number of pods, and a large number of beans to the pod, and also beans that will ripen as evenly as possible. The fact that beans ripen evenly will make the harvesting easier. If some are ripe and some are not you have to leave these beans out three or four days to allow the green parts to ripen. I cannot say too much about the work I consider should be done along the lines of producing beans that will ripen as evenly as possible. Then, we are all anxious that varieties may be produced that will be immune from disease in the bean sections of Ontario.

Mr. W. R. Reek: I am afraid I will have to plead guilty to having been raised in Kent County, and having been raised there it seems to me that Mr. Laird overlooked one very important point. He told you you could adjust the grain drill to sow beans with, that you could cultivate them with a two horse cultivator, and pull and rake them with a side delivery rake, but he did not call your attention to the most attractive point in bean growing, and that is the small amount of labor for the very considerable remuneration. There is another question that concerns the bean growers, and that is the increase in yield. I believe Mr. Laird will bear me out in this: fifteen or twenty years ago, around Murray Harbour, the yield was fifty bushels per acre, it is now twenty bushels. There is a reason for this and the reason is the lack of rotation. Just simply because beans belong to the legume family the farmer thinks he ought to be able to grow them year in and year out without any change in the soil. You can get too much of a good thing. Why, there are men with one hundred acres

of land who are cultivating fifty and sixty acres of beans, and as a consequence the land is becoming poor. Used in rotation, beans are one of the best crops for keeping up the fertility of the land, being a good nitrogen gatherer.

A MEMBER: Do they make good preparation for fall wheat?

MR. REEK: Yes, just as good as a summer fallow; put a drill on and you have a firm bottom for fall wheat, and you will get a better yield from wheat following beans than from summer fallow. There is no doubt, as Mr. Laird has said, that beans can be grown in every county in Canada, but there is one difficulty which faces the farmer, and that is threshing. There will probably be only three or four men in a neighborhood growing fourteen or sixteen acres of beans, and the question is: how are you going to thresh them?

A MEMBER: I do not live in a bean section, but a few of our farmers have grown them this year. Take the ordinary threshing machine and it is only a matter of a few minutes, on some makes, to adjust the pulleys so that you can thresh beans.

MR. T. H. MASON: Vary the speeds. I am in favor of that, but the average bean growers in the Province of Ontario are not satisfied with only varying the speed.

MR. LAIRD: We used to thresh our beans that way, but it took two, three, or four times as long to thresh ten acres of beans as it does now, but you can get along that way, I will admit.

MR. REEK: Yes, you will have that difficulty, and it certainly racks the grain machine terribly; we found that out ourselves. Those who are not living in the bean section have to go some twenty miles sometimes to get a bean separator. Take all our small counties in Ontario, lying east of Toronto, along the lake: they can all grow beans, but they will meet with this difficulty.

Now, as to the use of beans on the farm. The use of beans in a feeding scheme, in the various experiments at the different experimental stations, have shown beans to give as good results as any other food in conjunction with corn. They gave excellent results with skim milk. One difficulty to be guarded against is that they should not be fed to excess or you will get poor pork. They must be cooked, and thoroughly mashed, or soft enough to mash quite easily, and you will then find that the pigs will eat them greedily. Fed too readily they will produce soft pork.

A MEMBER: What do they usually sell at per bushel?

MR. LAIRD: From $2.30 to $2.40 per bushel. They have, the last two or three years, been selling at about $2 per bushel.

A MEMBER: $2.30 per bushel for beans to feed the hogs! That would be pretty expensive pig feed. Would it not be better to sell them if you can get $2.30 a bushel for them?

MR. LAIRD: Often you have colored beans, split beans, beans highly marked, and others dull; then it would pay you better to feed the beans.

A MEMBER: I was talking to Mr. Reek. He tells me that they have machinery in the elevators that will clean beans for you, and you get back split beans and the colored beans for feed.

MR. REEK: That is one fact I neglected to mention. In some of the bean sections these discolored beans are caused by disease; they are able to bring these beans up to eight or ten pound pickers, but they cannot take out the color.

A MEMBER: They have machinery for taking out the ordinary color in six or eight pound pickers.

A MEMBER: How do they become discolored?

MR. REEK: They are injured by wet weather in the fall.

PROF. ZAVITZ: With regard to varieties: I notice that white pea beans are worth a good price and there is always a market for them, but sometimes these colored beans will bring a higher price. The market for colored beans is somewhat limited and the question is: what would be the most reliable substitute to grow just now?

MR. LAIRD: As far as the pea bean, which is white, is concerned, it is the one which commands a steady market. Other varieties have been grown to a certain extent in the bean locality and I have sometimes found the price to be higher than the price of white beans, but they are not so reliable. Some years the market is very low for this class of beans. Over in New York State they have come to the conclusion that the black bean is not so susceptible to disease. We might take some white beans and black beans and cross them, and thus secure a bean immune from disease. That is a line of work, I believe, they are going to take up at the College.

MR. T. H. MASON: Speaking of disease in beans, and the growing of beans in new localities, would it not be possible to secure bean seed absolutely free from disease so that these new districts would not be affected?

MR. LAIRD: I think that it may not be quite impossible, but at the same time it is pretty difficult to get seed that is absolutely free from disease. Good seed might be obtained if you get it from a locality where beans have not been grown for a great many years. Perhaps there are some bean farms in the United States that make a specialty of selection and we can buy purer seed there than we are able to get from Ontario at the present time. In starting bean growing in a new locality try to get seed that is pure. The fact that you do not have any manure from the bean straw the first year will help to keep the seed pure.

MR. T. H. MASON: Is there any treatment for seed?

PROF. ZAVITZ: We are trying to find out whether there is any immunity in different kinds of beans. We are going out this fall to visit about ten of the best bean growers, and we will select about ten of the very best individual plants in each field, in order to find out whether by getting the plants about as near ideal as possible, and setting them out here, say one hundred individual plants or so, we shall be able to get a strain with all the good qualities and none of the bad qualities. Prof. Howitt is here, and we would like to hear something about the special bean diseases.

PROF. HOWITT: I may say that the disease known as "Anthracnose" is carried very largely through the agency of defective seed. Now, the disease first affects the buds and then works down into the plant. At one time it was thought that it might be possible to produce plants free from the disease; the beans might be hand selected from the seed bin, but this practice has not been found to be practical. Some experiments at Cornell University, made by Prof. Wichel, have shown that it is possible by selecting seed from buds that show no signs of disease to obtain seeds which are not affected. This is not practised very generally, but it should be practiced in seed plots from which to get seed for the field crop. That sort of work might be done here, at this College, or by the Seed Growers' Association, so as to provide seed that is free from this disease,

by securing seed from non-affected buds. I may say it was my privilege and pleasure to be down in the County of Kent and to be able to closely inspect this disease. As far as I can see, very little has been done in regard to checking the disease. I believe there is more disease now than there was some four or five years ago, and there is likely to be still more disease unless something is done.

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## SOME IMPORTANT WAYS IN WHICH FARM LIFE IN ONTARIO MIGHT BE IMPROVED.

N. Monteith, Stratford.

It has impressed me very much as a citizen, the changed conditions that have come over this Province within my memory. While I am not as old as the Chairman in Union work, I remember well what many of us termed the golden era of Ontario agriculture. At that time men used to be satisfied with farming conditions as they existed; they did not seem to be agitated by that unrest which has been so abundant all over the Province for the last ten or fifteen years. Let us find the cause if we can for this unrest. Who of us, among the older ones, cannot but remember the great numbers that attended our rural schools of Ontario. I remember at our own local school at that time there was an attendance of 110, the school was full. Where have they gone? They have largely scattered. Some have gone to the West, many more have gone to the cities and towns, but the North-west has swallowed up a very large proportion. That is to some extent one of the reasons for the depopulation, and explains where they have gone. But there are other reasons. We are beginning to be buyers in the world's markets, to become more speculative. We are becoming richer in some respects and poorer in others. Scores of men became suddenly rich in the West through property inflation. All these things had an unsteadying tendency.

I would like to touch on a matter of another condition that has brought about the unrest on the farm. We know that if we look up facts that we have been immense borrowers in Canada and Ontario; borrowers in the world's markets. We have been getting a regular flood of borrowed money from the old lands in Europe. What for? Largely for the improvement of urban conditions. These sums of money have been borrowed largely for the improvement of these urban municipalities, and much as these things add to the comfort and convenience of the people, we have not found them so largely in our rural municipalities. Some money has been borrowed by some municipalities for drainage schemes and the like, but outside of that very little has gone in our municipal corporations. This has all brought about a high standard of wages. It has created demands for labour which have raised the wages so high in most lines that it has become attractive to many of the working men in the country to change their probably lower wage-earning position there for the higher wage-earning position in the city. These things have to some extent injured country life, and the results have been that they have lessened the number of progressive young men on the farms of Ontario. We are beginning to wonder if there is not something else behind this change that is going on besides the pure love of money, and we have come to the conclusion that many of our younger generation have been possibly trained improperly; that they have not been given a love for their business; that they have been taught too much to look upon farming as merely a drudgery, not

as a happy life. Now, what are we going to do about it? How are we going to offset the attraction of city life. There is no doubt we want a certain amount of amusement, it is part of our make-up, and is necessary to young people in the country. They should be afforded opportunities for social intercourse and relaxation from their daily round of farm work. Then we have the secondary schools. They take the young men and the young women from the country to better their education, their minds are in that condition that they see the best side of city life. They see city conditions at their best, and after comparing them with farm conditions, not at their best, they decide that they do not want to go back to the country at all. All these things tend to keep our rural population from increasing. Now, it seems to me that by agricultural education, through work in our public schools, and the efforts of those who are grown up, we can do a lot to offset this. We want to attract community interest. While I agree with Prof. McCready regarding secondary schools in each municipality, that they are a splendid idea, I still hold that our sectional schools as we have them to-day are not doing much for community interest. I know from actual experience on the farm that if you have the people bring the community within a small circle that everybody will feel it best to co-operate in the work of that community. Get it widespread, then you get in touch with those who are not vitally interested. I have seen this exemplified recently in beginning the community interest idea in my district. First, bring the people together, then, after they have been refreshed and are in a conversational frame of mind, talk about school agricultural work, and other things. This is an ideal condition to aim at. If they become general the success will be permanent.

While there are many good things said in the press, there is no doubt that very often the best intentions of our citizens are upset by the press for the very fact that they are unnoticed. No doubt a man can make a name for himself in the public estimation by getting headliners in the press, but after all our first idea is to achieve success, and we should bear in mind that there is nothing more important for us to do than to help along the work of agricultural improvement.

Mr. T. H. Mason: We have been glad to hear from Mr. Monteith. We are making consderable progress on this question which must have a beneficial result in the agricultural communities of Ontario.

Prof. J. B. Reynolds: We have been taught in our institutes, and in our short courses, and in our colleges, for the last twenty-five or thirty years to increase production. We have a campaign on now for increased production. That is all very good. The farmer needs to be reminded of his obligation and debt to the community, and to the Empire. But we need, also, in order that the farmer may be encouraged to produce more, to teach him and the students here ordinary business methods I think it is the neglect of business methods as much as anything else. the failure on the part of the farmer to make the most of his farm in a business way, that accounts for most of the failures.

Will you allow me to appear again as a farmer, and to a small extent give you some of my experiences. A few years ago I had a few apples to sell. I wanted to get as much for them as I could so I wrote to a dealer in New Liskeard. I quoted him a price of $3.50 f.o.b., New Liskeard. He accepted my quotation by return mail and the apples were sent. I was speaking at a Farmers' Institute meeting a. St. Mary's and Lakeside last summer. I asked them what they had received for their apples the previous season, and I was informed that they had obtained $1.50 per barrel. It was open for every one of them, so far as I could see, to resort to the same methods that I did to secure for my apples $3.50 per barrel.

There is another thing in the matter of increased production. How can farmers

produce more with the same equipment? I have in my herd a cow, she is only an average cow, and Prof. Dean said when he saw her he would not like to have her in his herd. Of course, from an aesthetic point of view I do not think she would be taken for an artist's model, but she delivers the goods. Last year, including a period of twelve months, she produced 11,000 pounds. I think that was doing pretty well for an ordinary cow. She was well cared for and well fed. I state this to illustrate how good feeding and attention to stock will increase their productiveness. I somehow got the idea that protein was necessary to the production of milk, and I looked about for protein in a cheap form. I make sure of always having some in my barn. I buy three or four tons at a time. I believe that it pays; I know that it pays. This is one of the things that I learned from scientists. I learned also from a scientist that if you are going to make your orchard pay you must prune, you must spray, and you must cultivate. I do not know the scientific reasons for all this, nor do I know the scientific influence of lime sulphur in spraying, but I know its effect on the fruit. There is where the average farmer may make use, if he has brains, of what the scientists are trying to teach him. After all it is only a matter of knowing enough to want to know these things. I find as I go to Farmers' Institute meetings, or to Exhibitions, that farmers are apathetic. There is a want of interest in the countenances of the men. They do not want to know. Now, I say that the man with the right amount of grey matter is going to introduce whatever science learns for him, so that he is going to produce more with the same equipment.

W. C. Good and A. MacLaren also contributed to the discussion, the latter urging the importance of opportunity for play in the development of the country boy.

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## OPEN MEETING IN THE GYMNASIUM.

In the absence of the Honorable J. S. Duff, Minister of Agriculture for the Province of Ontario, the Deputy Minister, Mr. W. B. Roadhouse, occupied the chair. In opening he said: "In years gone by it has been the custom of this Association to have at its annual gathering at least one distinguished speaker from across the line. This plan has been productive of beneficial results, and will no doubt be beneficial in other years, but this year it has been thought wise to conduct the various meetings of this Association with our own Canadian speakers, and so it is my pleasure to-night to present to you a strictly 'made-in-Canada' programme."

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## PRODUCTION—MORE THAN USUAL.

DR. C. C. JAMES, TORONTO.

Eighteen million, seven hundred and fifty thousand (18,750,000) men are now under arms, most of them taken out of the producing class, all men in the consuming class, and a large portion in the destroying class. Up to December 31st, after five months only, twenty-three billion dollars ($23,000,000,000,) was the total expended, not reckoning on the destruction of property. In three months the little kingdom of Belgium suffered loss to the extent of over one billion dollars, ($1,000,000,000),

and the end is not yet, for two million (2,000,000) refugees are being cared for by Holland, England and France, and five million (5,000,000) within German lines are being fed by the United States, Canada, and other nations. The latest call is for at least one ship load of food every day.

Yes, all the world is in the war. The British Empire is at war, and Canada is just beginning to realize that she also is really at war. The call to Britain is "Business as Usual," and it is a good slogan, for Britain is a business country and if she can fight on land and on sea and at the same time carry on business as usual she will be doing well. But Canada is a food producing country, and therefore, the slogan "Business as Usual" will not do for us. Let me give you another, "More Than Usual." Now the test is up to us. Shall we carry it through? The time has now arrived for us to stop advertising, and prove things by our work, and that work is the production of food "More Than Usual." We have to feed ourselves, feed Britishers at home and at the front, and feed destitute Belgians. The call is for more wheat, more oats, more meat, more cheese, more flax, more—more all along the line. We have the biggest task ever assigned to this country.

And, first of all, let me say that this task is not limited to the farmers. There is a task laid upon all towns and cities. These have been growing and expanding, extending their boundaries until there must be at least one hundred thousand acres lying idle, unproductive, but cultivable in our towns and cities. Living nearby are tens of thousands out of work. Schemes have been suggested of taking the landless men out to the manless lands to grow wheat. That would probably cost $2.00 to grow $1.00 worth of wheat—it would not be economical, a waste of men and money. Why take these men in thousands to the land to grow crops about which they know nothing when right at their doors are vacant lands that will produce food? Surely the cities can secure the use of this vacant land, and set some of the unemployed at work growing potatoes and other vegetables, crops that require labor all through the summer. Under proper supervision men with little or no farming experience can be used to produce food of this kind. They will be paid for their work and a double purpose served. Every ton of food thus produced releases another ton for export. Among the city unemployed there may be many who would gladly help the farmers and who would be of some real value. Schemes for placing men of some farming experience with farmers who need help should receive attention in every city. It seems so easy now to organize committees for relief work abroad. Why not turn some of this organizing energy and enthusiasm into relief at home along these lines? Committees of this kind should have rural representatives on them, including officers of the Women's Institutes who have recently proved their efficiency.

Now for rural production, this can come only from using the farm community as it now exists. For 1915 there is only one source of supplying this demand for "More Than Usual"—the farms now occupied in Canada. In other words, it is a case of every farmer now on a farm producing more. If more are to go on the land let us send the extra workers to assist the farmers now at work. The question of opening up new areas is quite another problem, one for 1916 and 1917, and the years that follow.

The call is for more food. The first thing that suggests itself is increased acreage. Let us have another million or two acres of wheat, many people say. The worst thing that could happen to Canadian agriculture would be the attempting of too much, and the spreading out of labor to its dissipation. Ten million (10,000,000) acres of wheat producing twenty bushels to the acre will give more crop than

twelve million (12,000,000) acres producing fifteen bushels to the acre. It would mean twenty million (20,000,000) bushels more produced at less cost. What we want to understand is that it is millions of bushels, not millions of acres that is called for; more milk and butter and cheese, rather than more cows. It is a day when the economized use of labor will tell. Farmers must keep their feet, and not be stampeded by high prices. There is great danger of the busybody rushing about so fast that he does not do real work. True patriotism calls for clear thinking and wise planning. Nothing but the best that can be done should be aimed at. A good seed bed and good seed are worth more to the farmer and to the Empire than a few more acres. If he can increase his acres and farm well at the same time, all the better. Then the next danger comes from the temptation to rush off into something new. There should be no novelties in this campaign. The old lesson, the old teaching is of more importance to-day than ever before. We would do well to follow the practices which have been proven in our district. All kinds of food are demanded. No new experiments should be tried. All that is asked is for the farmers to start in now and put into practice what the experts and the successful farmers have been teaching these years past. This war is a serious business. Hilaire Belloc says that it is more serious than the Reformation, the discovery of America, or the discovery of printing. This will more and more come home to us in the next few months, perhaps within the next few weeks. There is need of counselling and conferring, hence, the campaign now being started. The farmer who quietly, honestly, and determinedly lays his plans for more wheat, more oats, more milk, more beef, more flax, and more of almost anything that he knows best how to grow will be doing only his duty. He will be contributing what he alone can contribute, and he will be helping in the fight, for, as Napoleon said, "An army fights on its stomach."

Let us remember that it is more bushels per acre, more pounds of milk per cow, and more pounds of meat per animal that will count, which will mean more total food per farm. Let us, in 1915, make good on the farmers' fighting line with "More than Usual."

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## A TRIP TO NEW ZEALAND, AUSTRALIA, CHINA AND JAPAN.

DR. CREELMAN, PRESIDENT ONTARIO AGRICULTURAL COLLEGE, GUELPH

Dr. Creelman explained that some time ago the Government of New Zealand appointed a board to establish an agricultural college, and he had been invited, after considerable correspondence, to go and give them the benefit of his experience in the Ontario Agricultural College, which had now been in existence for forty years. While in New Zealand he had had the opportunity of attending and taking part in the meetings of the British Association of Science in that Dominion last summer. When the steamer left port the war was only beginning, and there was much anxiety and uncertainty as to its progress and outcome. In consequence of the activities of several German cruisers in the Pacific no lights were shown at night. On reaching Honolulu a stop was made and an opportunity given to see some of the country. Before the United States obtained this island Britain had an opportunity to purchase it, and it might not have been a bad thing for Canada if she had done so. As all tropical fruits and sugar cane grow to perfection, our supply might have been obtained there. The temperature is almost stationary the year round, the thermometer ranging between 70 and 80 degrees. Sixty per cent. of the population is Japanese. On the plantations immense ploughs are used to

turn furrows three feet deep, and on one of the largest of these farms 5,000,000 gallons of water was used in one day for irrigation purposes, a larger quantity than is used in the same time in the water systems of either Toronto or San Francisco. They returned to the boat, but no move was made for some days after the time set for departure, owing, it is supposed, to the proximity of some German ship.

### A Compact Dominion.

However, nothing turned up to mar the passage, and New Zealand was reached safely. It is a compact little Dominion about the size of England. Its isolation causes it to be little affected by the passing fads and fancies of Paris or New York, and protects it from tidal waves of heat, cold, immigration, fashion, speculation, or invasion. Almost all the white inhabitants are English and Scotch, and the country is intensely British, not only in sentiment, but in habits. They are extremely patriotic and loyal to the mother country, and the fear that Japan may some day want to annex the island has inclined the people to take their military duty more seriously than Canadians do. They have a navy, and a very respectable army. When the war broke out a contingent was sent forward and a general effort made by the farmers to increase their production, especially of wheat, which was not grown largely. In three weeks' time farmers could be seen all over the country breaking up pasture land. When asked why they were doing it, or whether they expected high prices, they replied that the Premier had said that the country's needs were the Empire's needs, the Empire required wheat, and there would be no war prices, as the Government would control it, and $1.00 per bushel would likely be the highest allowed.

The Maori, or native races, were the most remarkable black people perhaps known. It was wonderful how they had developed with the country since the advent of the whites. Both men and women enjoyed the franchise, and appeared to use it with intelligence and a sense of responsibility. Members of their race not only sat in parliament, but occupied positions in the cabinet. They had risen true to their faith. The island, which was first settled by the Maoris about five hundred years ago, was discovered by that famous navigator, Captain Cook. Sixty or seventy years ago it was decided to make it an English colony. When first it was conquered and the natives subdued, it took some time to overcome their resistance. As they were driven back they retired up the sides of the volcanic mountains. At one time the English forces of about 5,000 men ran out of food, and a halt had to be made to await supplies. The story goes that the Maoris, hearing of their enemy's difficulties, sent them a generous supply of sweet potatoes, so that, as they said, the fight might go on. This would have cheered the heart of an Irishman, for what true son of Erin could resist the temptation of potatoes and a good fight?

New Zealand had a splendid school system. A child was taught with the object of helping him in the calling he intended taking up. A pupil was given an opportunity to learn and experiment and find out for what he was best suited at a period when a child's time was not worth much commercially, and he was not left to try this or that trade at a time when he should be well settled in his apprenticeship and earning something. A good training also was given to the girls. Too many in Canada did not discover that they were not cut out for the trade they had chosen till it was difficult, or altogether impracticable, to make a change and begin over again. By learning at school, too, a child was able to command good wages much earlier, and become independent. No other government did so much for education as that of our own Province. Sometimes, perhaps, too much was done by the State, but there were things we might yet learn from others. There was one

thing about which Canada should think seriously, the treatment of the large number of foreigners coming into this country. What was going to lead them to adopt our standards? True, they learned English, but that was about all that could be said. Soon the West would hold the balance of power, and swing the East, and the foreigner in the West would control affairs. Preparation should be made for that, and the present moment was the time to begin, and not wait till the inevitable had happened. Serious preparations, too, should be made for the great changes that would almost certainly come about when the present war was over.

### Australia an Immense Country.

In Canada New Zealand was looked upon as a very close neighbor of Australia, but it was 1,200 miles from New Zealand to Sydney, a five days' journey, about the same time as was taken between Canada and the Old Country. Australia was an immense country of 3,000,000 square miles; 2,500 miles long and 2,000 miles wide; larger than the United States without Alaska; nearly as large as Canada; three-quarters the size of Europe, and comprising one-quarter of the Empire. Canberra, the new capital, was being planned on an immense scale and covered 100 square miles of territory. The climate was mild, and 96 per cent. of the population was Australian or British born. Even the Australians themselves admitted that they had the best country under the sun. It was easier to make a living than here, and there was a fine national sentiment, but the people had no better moral fibre than Canadians. They looked to Europe for everything, and it was a regular little England. Everything from drugs to tobacco was from the Old Land, even the frames and glass in the shop windows. Their chief products were wool, of which they exported $130,000,000 worth per year, more than Russia and Argentine together; they also exported mutton, butter, rabbits, and 90,000,000 bushels of wheat. Their exports were $80 per head, while Canada's were $50, and their imports $70, about the same as in Canada. Twenty thousand miles of railway connected the various states, but owing to the delay in confederation these were built by the various states, with the result that they were of different gauges. There were the 3 feet 6 inches, the 4 feet 6½ inches, the 5 feet 3 inches, the 2 feet 6 inches and the 2 feet gauges. Nothing could be more awkward, as trains could not run through the whole journey. Every time the gauge changed, a change of cars was necessary, and it was not pleasant to be turned out of a sleeper in the middle of the night.

It was a shame that in a country like Canada, with acres and acres of unoccupied area land outside the cities and towns should be sold by the foot. If a man could have a lot large enough to keep a garden of his own the cost of living would be materially reduced. But when a working man was asked to pay for a lot by the foot, he could not afford to buy or hold more than was required on which to place his house. In Australia land near the cities was still cheap, and thousands of people working in town lived on a good sized lot in the country. It not only helped to make living cheaper, but it was a good thing for the children to grow up away from the crowded cities. The fact that they had some chores to do in the evening helped to give them a better start in life. This was an aid towards good citizenship which our boys did not get. One day on going to the station at Melbourne, Dr. Creelman became anxious lest he should miss or take the wrong train. In a few minutes after his arrival six trains came into the station. He inquired of the station master whether his train had arrived, and was asked what train he wished to go by. "The 9.06." "Well, it will go at 9.06." "But aren't they sometimes late?" "No, all trains run on time here." "But I have heard of trains on time, that weren't

on time." (In Canada). "That makes no difference, trains run on time on this road." "But why are there so many to-day, and where are the people coming from?" "From the country, and there are no more than usual." "But what is bringing all the country people to town to-day?" "What do you mean, these are not country people, they are people who work in the city, coming in." "Why do they leave the city, is there a pestilence?" "Why no, they live there all the time on their own property." One thousand five hundred trains (1,500) trains run in and out of Melbourne every day, and a working man can come in ten or eleven miles for five cents. These suburban trains carry 200,000 passengers per day out of a population of 500,000. This would be impossible in Toronto or Montreal on account of the price of land and the state of the transportation facilities. The Australians say, "Why not? We own the land and the railways." Here only a few wealthy citizens have the privilege of a house in the country. In Toronto the sole topic on a street car would be the price of land on Yonge street or in Rosedale. In Australia land prices are not mentioned. One might hear of the jockey races, though, as there are three hundred horse meets in a year, and there are sixteen race courses within a radius of ten miles of Sydney. The people coming in in the morning are usually laden with flowers grown at their own homes.

Like New Zealand, Australia always feels that trouble, especially with Japan, may come at any time and it is well not to be altogether unprepared. They begin to train the boys in the schools. Cadets from twelve to fourteen years drill ninety hours per year; senior cadets from fourteen to eighteen years of age drill twelve and one-half days or twenty-four evenings, and the citizen forces, from eighteen to twenty-five years of age, drill sixteen days. This gives them 170,000 men over twenty-five, and 360,000 men over eighteen years of age, trained for defence purposes. The training camps are well conducted, and no parents need be afraid to allow their boys to go to them. They are quite popular, and a lot of hard work is turned into fun. At one big camp 50,000 men drill and return home tanned and stronger for their outing.

There has been a great deal of advanced industrial and social legislation. In fact almost everything has been tried. They have old age pensions, and very good factory laws, with no sweating. The minimum wage, though, does not reduce the number of unemployed. One of their slogans has been "Eight hours of work, eight hours of play, eight hours of sleep, and eight bob a day." A law that has done much good is the maternity allowance. Fifty dollars has done a lot for both mother and child at a time when a little extra money is required to procure proper care and nourishment. In 1912, $3,000,000 was given under this act.

From time to time Australia suffers terribly from drought. These dry spells come without warning and at irregular intervals. On a trip through a section suffering from this affliction not a single blade of grass was to be seen. The Murray river, a stream as large as the Ottawa river, was dry long before the sea was reached. Thirty million (30,000,000) sheep were destroyed, and large numbers of colts, together with their mothers, had been taken out and shot. This state of affairs frequently lasted for months, and Canadians would be driven mad. Not so, however, with the Australians, who are ever hopeful. "Come back, Dr. Creelman, in a few months and we'll show you the finest country under the sun." The state debts were something enormous, amounting to $1,355,000,000, or $300 per head. This money has been spent on railways, telegraphs, telephones, irrigation and harbors. Confederation had been put off too long in Australia, and we in Canada owed a debt to the Fathers of Confederation who welded the country into a nation so early in its history. In Australia one state or section wonders how Providence

can allow the people in other portions of the Commonwealth to live, and when it comes to the central parliament it is generally a case of every state for itself. The centre and north were hot, while the south of the island was quite moderate. While all the countries visited on the trip had some things that we lacked, yet it was a pleasure to come back to old Ontario, which had never had the heat, a flood, or a drought.

### Japan and China.

Japan is a month away from Australia, but on the way a call was made in China. It almost bewildered one to look back on the history of that huge country, with her teeming populaton. For forty centuries that wonderful people had been tilling the same soil, much in the same way. China, unlike Japan, was altogether unorganized, and it was doubtful if more than two per cent. of its population yet knew whether its government was republican in form or a monarchy. Shanghai, a great seaport, with a population of several millions, was ruled by about 30,000 foreign residents. Their part of the city was quite modern, but the native sections were without even sewers. On the great Yangtsekiang, 3.000 miles long, there were 1,300 big steamers. China kept industrially strong, but as she hated militarism, she was not in a good position to deal with other nations, as she could not enforce her will. On the other hand, Japan admired a soldier, and Dr. Creelman had seen a celebration held on the receipt of news that a member of the family had been killed in action. A member of another family who returned alive from the siege of Kiaouchow was given a most cool reception, and was almost turned out. He moped round for days, not knowing what to do with himself. They were a patient people, and worked most industriously. A Japanese farm hand would delight an Ontario farmer. During his stay the speaker had not been able to rise early enough to see them go to work, nor had he been up late enough to see them cease work. A farm hand will hoe till it is too dark to see, and then water the plants till the moon comes up, and the hoeing can be resumed. He does this, too, for $50 per year, and pays his own board. The Japanese train service, like that of Australia, was good, and when a train was advertised to leave at 12.02 it left at 12.02. Even after war had been declared, and it was not known where the German ships might be, the boats continued to leave according to schedule time.

One thought more. The love of children is conspicuous everywhere—at every turn you make in China, and even more so in Japan. Children everywhere, and no scolding or quarrelling at any time. I have noticed them in the streets, in parks, in shops, and in their homes. It is the same everywhere. The old grandfather and grandmother will be seen walking out with a child holding each hand, and perhaps have one strapped on each of their backs. They see everything, pointing out to the children the trees and flowers and birds, and buying little things for them. Girls and boys mere children themselves—will have little tots strapped on their backs, and will engage in play with them, and never a sign of impatience. I tell you that Christian Canada and Christian United States, and Christendom everywhere, may learn much from that thorough education—partly inherited from the ancestors and partly inherent in the atmosphere—which brings up the child in Japan to an absolute and uniform respect, not only for those that are older, but also for those that are of the same age. When a little miss comes into a Japanese home she is bowed to, as if she were a lady, and she bows in return; and all the way through the processes of education, parental authority is absolute, with a peaceable, patient, willing giving-in to the observance of the rule of kindness and affability and love from one member to the other.

# SEVENTH ANNUAL REPORT

OF THE

# ONTARIO
# Corn Growers' Association

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1915

*To His Honour,* JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

Owing to a change in the Secretaryship of the Corn Growers' Association, the preparation of the annual report of that Association for 1914 was delayed to such an extent that it is deemed advisable not to print the report separately, but to combine the proceedings with a later report.

The financial statement is appended.

Respectfully submitted,

JAMES S. DUFF,

*Minister of Agriculture.*

Toronto, 1915.

# CORN GROWERS' ASSOCIATION.

FINANCIAL STATEMENT FOR THE YEAR ENDING FEBRUARY, 1915.

| *Receipts.* | | *Disbursements.* | |
|---|---|---|---|
| Balance from last year | $302 62 | Prizes | $1,168 25 |
| Legislative grants | 652 50 | Printing | 428 28 |
| Essex County grant | 250 00 | Expenses of Directors and local judges | 351 97 |
| Kent County grant | 250 00 | Expert judges and lecturers | 152 50 |
| Township grants | 335 00 | Advertising | 118 85 |
| City of Chatham grants | 200 00 | Express, cartage, etc. | 120 25 |
| Building for Corn Show—heat, lighting, etc.; furnished by Chatham City | 300 00 | Building, light, heat, shelving, etc. | 300 00 |
| Membership fees | 418 50 | Corn for class work | 15 00 |
| Space in Exhibition building sold | 253 00 | Grants to school fairs | 20 00 |
| Advertising in prize lists | 288 00 | Band and elocutionist | 49 15 |
| Donations | 170 00 | Postage | 72 60 |
| Kent Publicity Association | 47 00 | Membership buttons | 31 40 |
| Refund of express | 14 67 | Engraving medals, etc. | 20 92 |
| | | Salary of Secretary | 150 00 |
| | | Salary of Treasurer | 50 00 |
| | | Stenographers | 32 00 |
| | | Janitor | 25 00 |
| | | Photographer | 4 65 |
| | | Auditors | 8 00 |
| | | Incidentals | 20 73 |
| | | Balance on hand | 341 74 |
| Total | $3,481 29 | Total | $3,481 29 |

# TENTH ANNUAL REPORT

OF THE

# ONTARIO
# Vegetable Growers' Association

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

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PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1915

Printed by
WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO.

*To His Honour* JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I herewith present for consideration of Your Honour the Annual Report of the Ontario Vegetable Growers' Association for 1914.

Respectfully yours,

J. S. DUFF,

*Minister of Agriculture.*

TORONTO, 1915.

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F. F. REEVES, President.

# Ontario Vegetable Growers' Association

## OFFICERS AND DIRECTORS, 1915.

*President*: F. F. Reeves, Humber Bay.

*First Vice-President*: J. J. Davis, London, R.R. 2.

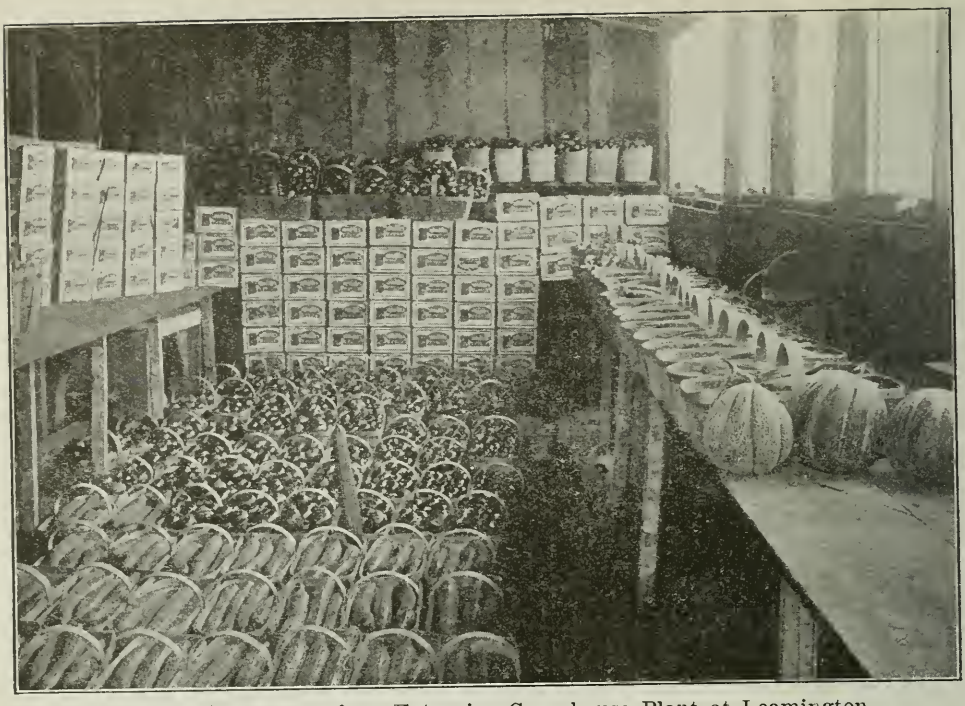
*Second Vice-President*: C. McConnell, Aylmer, Que.

*Secretary-Treasurer*: J. Lockie Wilson, Toronto.

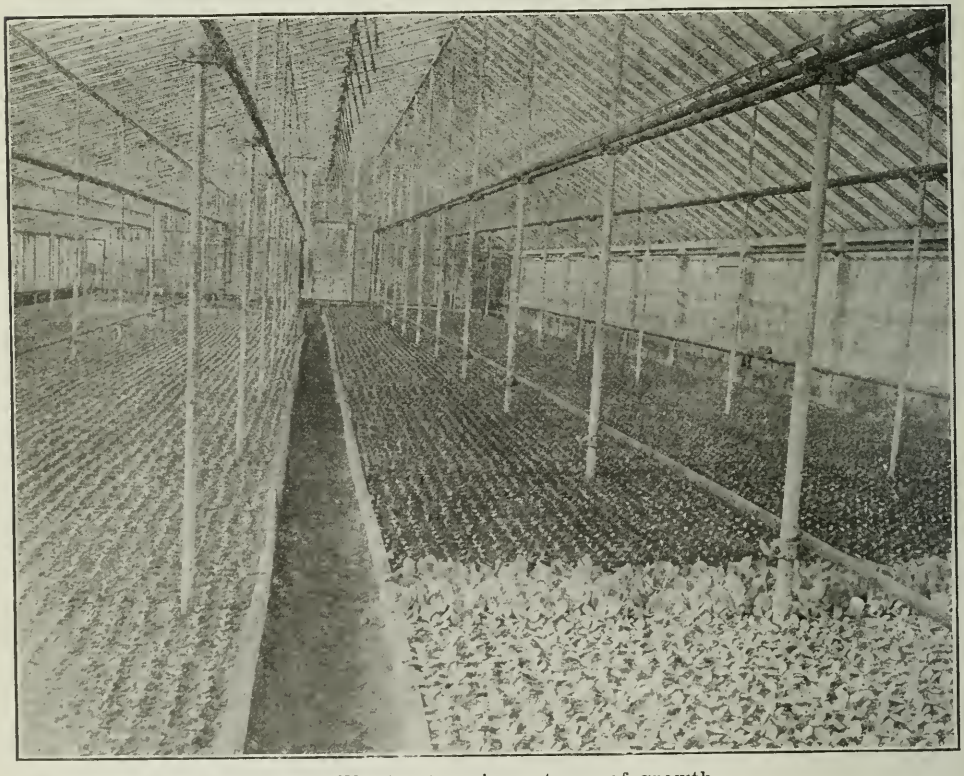
*Directors*: T. H. Ketcheson, Frankford; J. H. Modeland, Sarnia, R.R. 3; W. McMeans, Brantford; J. A. Sorge, Dunnville, R.R. 5; E. K. Purdy, Kingston; J. Moulton, London East; Conrad McConnell, Aylmer, Que.; J. R. Teeple, St. Thomas; J. W. Smith, Sarnia, R.R. 1; C. Dempsey, Stratford; Maurice Renaud, Tecumseh; J. W. Rush, Humber Bay; Chas. Brown, St. Catharines; A. Nelson, Fonthill; H. B. Dawes, St. Williams; G. B. McCalla, St. Catharines.

*Executive*: F. F. Reeves, Humber Bay; Thos. Delworth, Weston; J. Lockie Wilson, Toronto; J. J. Davis, London, R.R. 2; Conrad McConnell, Aylmer.

*Representative to Canadian National Exhibition*: Thos. Delworth, Weston.



The Shipping Room of an Extensive Greenhouse Plant at Leamington.



Lettuce Plants at various stages of growth.

# Ontario Vegetable Growers' Association.

## TENTH ANNUAL CONVENTION.

The tenth annual convention of the Ontario Vegetable Growers' Association was held in the Parliament Buildings, Toronto, on Tuesday, November 10th, 1914. Every Branch in the Province was represented and great interest was taken in the proceedings.

## PRESIDENT'S ADDRESS.

C. W. Baker, London.

The greatness and importance of the Vegetable Growing industry in the Garden Province of Canada is emphasized to-day by your presence in such large numbers from important vegetable producing centres of the Province of Ontario. I welcome you most heartily, you whom your fellow-members have chosen to represent them at this gathering, and thrice heartily do I welcome those enthusiasts who come here at their own expense.

Nine times have we gathered here before, each year with increasing interest, higher expectations, and a more general realization of the benefits to be gained by thus convening together.

In thus welcoming you to the tenth annual convention of the Ontario Vegetable Growers' Association, I sincerely trust you will realize the importance of making use of every moment of the time at our disposal.

As a member you have a duty to perform in imparting the expert knowledge you may have regarding our business and to take home to your neighbors the valuable ideas you have been privileged to hear.

This is your Convention and it will be what you make it. "Ask reasonable questions and I guarantee you an answer." My desire is that each member will feel perfectly at ease and take full advantage of this occasion, this grand opportunity to gain knowledge of up-to-date methods in vegetable growing. Let the warmth of fellowship take possession of each delegate, so that all may be fused into one grand, earnest, eager, enquiring audience. Let us be filled with a high sense of honor and obligation to the Ontario Vegetable Growers' Association as a Provincial Institution.

The day of scientific gardening and intensive vegetable growing, under glass and out-of-doors, is at hand in the Province of Ontario. The art of packing and the science of selling are two branches of the business that must receive more attention in the future. We must grapple with these important questions very soon. The public are demanding neat packages in vegetables as in fruits. We must give the people what they want, or in other words, what they will pay for. I believe in advertising neat packages, and direct dealing with the consumer as much as possible. This is a field of endeavor that is wide open, and awaits the man with a vision of the future.

We can accomplish much by working in unison, by co-operation and the adoption of uniform packages, by establishing buying and selling agencies and in other ways. We must be wide awake, must get on the crest of the wave of progress, and be always up-to-date. Give the public what they ask and then ask the public the price.

Speaking of prices, we have had to accept for many lines of our products less money than formerly, but, as our members are public-spirited men and women, we bear the loss uncomplainingly and look into the future unflinchingly and prepare for "Business as Usual."

Our members are building new greenhouses of modern construction, installing watering systems, using new methods of fighting fungus and insect pests, and are always searching for the strictly honest seedsman. Men have said to me, "It is not so much the price; I want the best, and I want what I pay for."

A New Celery Bleacher.

Our members have taken a lively interest this season in the Provincial Field Crop Competitions. Toronto, Ottawa, and London Exhibitions staged these prize-winning vegetables comprising celery, tomatoes, onions, and early potatoes. Visitors to these shows were very much interested in these collections of the finest vegetables produced in the province.

The dropping of the Horticultural Show will, no doubt, be a great disappointment to thousands of growers; a great educational opportunity—a marvelous advertising medium—is lost to Ontario producers.

We, as vegetable growers, are indebted to our Governments for their generous aid in providing ways and means in men and money, to experiment, test and try out new methods, new varieties, new ideas, which we as individuals cannot hope to fathom. Our programme to-day will furnish us with much of expert wisdom made possible by the Government's far-sighted policy of helping the grower to help himself.

Several new branches have come into existence this year, and others are anxious to become members. This is a work that should go forward. Organize new branches, stimulate the old—in a word, move forward, keep going.

If for any reason we fail to accomplish the desired end in a project launched by our association, let us drop it for the time being, and devote our full energies to something that gives great promise of success.

Let us be patriotic and shrewd enough to spend our money with Canadian business concerns, and thus help to keep the people employed who consume our products.

Let us be patriotic and shrewd enough to spend our money with Canadian

I venture to say that no class of producers in this fair province responded so quickly or generously as did the members of the Ontario Vegetable Growers' when the appeal came for help for our soldiers and their families.

These are strenuous times for the British Empire to which we are proud to belong, and you will agree with me when I say, that as individuals and as an association we are prepared to do our part to crush this monster greed who seeks to enslave us. We can be counted on to help keep the flag flying.

Thos. Delworth: The President touched on the matter of the Horticultural Show being dropped this year. I may say that that was not dropped through any unwillingness or any fault on the part of your Association or the officers or Directors that you elected representing the Board. We, as perhaps you are aware, agreed sometime ago, that if provision could be made to hold the show we would waive our prize money this year, that we would allow the Patriotic Fund to take all gate receipts and that we would let all our prizes go into that Fund. The difficulty seems to have been to get a suitable place in which to hold the show. The Exhibition buildings, as you know, have been taken over by the military authorities for mobilization purposes and we could not use them. We thought at one time we could have secured the Arena, but it seems arrangements could not be completed as we had hoped, and, not having a suitable building, we had to forego the show this year.

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## REPORT OF THE SECRETARY-TREASURER.

J. Lockie Wilson, Toronto.

Vegetable crops for 1914 have been above the average, notwithstanding the fact that in some parts of the Province dry weather in the summer somewhat retarded growth. While in a large section of Europe famine seriously threatens, in consequence of the ravages of war, here, at least, we are blessed with plenty for our needs and some to spare for those not so fortunately situated. That vegetable growers are thoroughly imbued with the spirit of patriotism, as well as generosity, is shown by the fact that not only have a number of the younger men answered the Empire's call to arms and gone to the front, but large contributions of vegetables were donated and sent to the troops at Valcartier, and also to unfortunate Belgian refugees. The Toronto Branch alone sent two carloads of their products, but, for some reason not known to the donors, no acknowledgment was made of the receipt of these consignments.

Increased production has had the tendency to lower prices. This would be evened up if the price of that which the growers required to purchase was reduced in proportion, but this, unfortunately, is not the case. Your requirements remain at a high price, while, as mentioned, your products bring lower prices.

The seed purchased by our members has, in the majority of cases, been true to type and variety, and the percentage of vitality has also been satisfactory. Some of the Branches failed to get their orders for seeds filled as early as they expected. This is partly due to the fact that the orders were not received early enough, and it has also been given as a reason for the delay that the varieties were difficult to procure.

There is one outstanding feature of the war now being waged which will materially affect the vegetable growers of Canada, and that is the production and supply of European grown seed, which has been the kind largely used by our people in this country. This being the case it is up to you to prepare for such future shortage. For the spring of 1915, however, it is not anticipated that the shortage will be serious, as there is a considerable reserve crop from last year. Unless, however, steps are taken in 1915 for the following year's crop of seed, prices are likely to be exceedingly high and the supply extremely limited. To give you an idea of our dependence on the European source of supply last year, the importations for the Dominion of beet and mangel seeds was 1,285,198 lbs., of which 452,721 came from France and 448,022 from Germany; 32,966 lbs. of carrot seed was obtained from France and 126,687 lbs. of turnip seed from France, and 224,162 from Holland. The importation through the Toronto Custom House alone was 4,621 lbs. of radish, 1,864 of cabbage, 95 of cauliflower, 6,825 of garden beet, 920 of garden carrot, and 1,202 of celery, and 1,900 lbs. of parsnip seed, the latter from Germany. The value of the beet and mangel seed imported into Canada from Europe was $385,559, of carrots about $16,000 and of turnips $60,000. In this connection I have received the following letter from Mr. Geo. H. Clark, Dominion Seed Commissioner:

"Permit me to recommend for the serious consideration of your Agricultural and Horticultural Societies and their members the advisability of preparing for the home production of those root, garden and other seeds that have heretofore been imported from Europe.

"It is anticipated that the reserve supplies in the possession of Canadian importers may be sufficient to prevent a pronounced shortage in most kinds of seeds for next spring planting. If, however, the farmers and gardeners of North America, and of Canada in particular, neglect to grow their own supplies of those seeds which we have depended on France and Germany to produce, they may have to do without them, because the supply of many kinds in all probability will be exceedingly limited and the prices correspondingly high.

"We depend principally on European seed growers for seed of sugar beets, mangels, carrots, turnips, swedes, garden beets and carrots, cauliflower, parsley, parsnip, radish, spinach, garden turnips, cabbage, rape, vetches, florists' stocks, and many lines of bulbs and nursery stocks.

"They have been grown in Europe because labor experienced in their production has been available at low cost. The climatic conditions in Ontario are superb for the production of all kinds of seeds that are imported from Europe.

"There is no mysterious science about the growing of field root and garden vegetable seeds of good quality. If good, sound, shapely roots or plants of medium size are planted in ordinary soil early in the spring nature will do the rest. Care should be taken not to plant two varieties near to one another, as cross-fertilization would destroy the uniformity of type. Persons contemplating the production of seed of field root and garden crops would do well to place themselves in communication with an officer connected with one of the experiment stations who is working with the particular crop to be grown."

Tomatoes tied to stakes.

Celery and Beans after Spinach. Three crops in a season.

We also hope to have here to-day Prof. Macoun, who will give an address on the production of vegetable seeds in Canada.

In order to encourage home grown seed the Hon. Martin Burrell has authorized the payment of subventions to competent, *bona fide* growers of selected stock seeds of field roots and vegetables, regulations for which can be obtained on application to the Seed Commissioner, Ottawa. The subventions are given in order to equalize the difference in the cost of labor paid by European seedsmen.

We are making progress as far as our membership is concerned, but not as many new Branches are being organized as we could wish to see. Speakers were sent to a number of the Branches which asked for them, and good audiences have been reported.

## Reports of Branches.

*Aylmer.*—The work carried on by this Branch has been, principally, of an educational character. Several meetings were held and addresses given by Mr. S. C. Johnston and others. Supplies were purchased through the St. Thomas Branch.

*Brantford.*—Purchased one car baskets and other supplies, one car salt, and seed from Germany. A new plan of campaign was adopted. Instead of inducing men to become members by telling them what they can save and benefit by becoming members, it was attempted to show them what is being done in the way of co-operative buying. So sure are the Board of success, that they have raised the annual membership fees from 50c. to $1, and a time limit of three months to become a member. This may result probably in a smaller membership for a year or two, but, after results have been shown, it is expected that more and better members will be secured, as twenty good men are better than fifty poor ones. The suggestion is made that the Ontario Vegetable Growers' Association consider carefully the United Farmers' Co-operative Company, as a means of purchasing supplies through the Central Association.

*Dunnville.*—Meetings are held on the first Saturday in each month. The principal difficulty this Branch experiences is that a market cannot be secured for all the output of the members, especially as regards cabbage. Tomatoes and potatoes, however, sell readily, about 21,000 bushels of the former having been grown, and four of the largest potato growers raised 4,000 bushels of this vegetable. This is a new line of production in this section which is only just beginning to develop. Several entries were made for the Field Crop Competition, and a marked improvement was shown in the crops judged as compared with 1913.

*Fonthill.*—The Welland Branch of the Ontario Vegetable Growers' Association is pleased to be able to report a very satisfactory and prosperous year, in which the membership was doubled, and large quantities of supplies were bought co-operatively to the convenience and profit of every member of the Association. These purchases included one car of baskets, two cars fertilizer, one car berry boxes and one of spraying material. The meetings have all been of much interest, especially that held on the grounds of Mr. G. C. Brown, one of our members. The Welland Branch has prospects of another successful year in 1915.

*London.*—During the winter three special prizes were competed for by members. The Branch has contributed generously to help the families of men who have gone from this District to the war, and this aid will be continued during the winter.

*Ottawa.*—The Ottawa Branch of the Ontario Vegetable Growers' Association has not carried on so aggressive a campaign this year as formerly, owing chiefly to press of work preventing the members devoting the usual amount of time to the Association. The customary summer excursion and local Field Crop Competitions were dropped for the past season, but a large number of special prizes were offered on fruits and vegetables at the Central Canada Exhibition, and a Special Exhibit, as usual, was put up and donated to the City Orphans' Homes. The customary municipal grants were received from the city and two of the surrounding townships, but the committee appointed to wait on the Council of the other township neglected their duty and none was received from them. On the

Peas in Northern Ontario.

whole, crops have been very good, except the very early ones, which were seriously affected by severe drouth, but prices in most cases have been low. Labor has been more plentiful and lower in price, but it is difficult to get satisfactory help.

*St. Catharines.*—During the year 1914 seven meetings were held which were all well attended. Membership shows an increase. Delegates have attended two Conventions during the year 1914, with such satisfactory results that the Branch has appointed two delegates for the Convention this month. Splendid meetings were held and all are in favor of the Association and its valuable service to market gardeners.

*St. Thomas.*—During last winter up to April we held meetings twice a month with a fair attendance. The larger part of these meetings were addressed by

outside speakers, and were very interesting, and were of benefit to the members. We are buying our supplies co-operatively as usual. Our membership has decreased.

*Sarnia.*—This Branch has had a prosperous year, having over 100 members. A donation of $100 was made to the Belgian Relief Fund, and at the County Fair our Branch had a fine display of vegetables which were sold by auction and the proceeds handed to the Patriotic Fund. Prospects are bright for 1915.

*Stratford.*—The Stratford Branch held regular meetings during the year, at which discussions took place relating to matters of interest to the members. Mr. S. C. Johnston and Mr. Kerr gave addresses, all of which were appreciated by members. Considerable amount of supplies required by members have been bought by our purchasing agent, the advantage of co-operation being very apparent in some lines. At a meeting of the Stratford Agricultural Society the President of the Stratford Branch of the Ontario Vegetable Growers' Association was appointed a Director of that Board.

*Simcoe.*—Our Society is not as large as it should be, but progress is being made. A number of good meetings were held last winter. During the past season Mr. A. C. Pratt, M.P.P. for South Norfolk, gave generous prizes to several lads in crop competitions conducted by themselves. The President and the Secretary were the judges. Our members are becoming more interested each year in the work.

*Tecumseh.*—The year 1914 was a very successful one for our Branch; we have increased our membership, and more interest was shown at meetings by the members attending, also in discussion. Mr. S. C. Johnston attended one of our meetings last spring and gave an interesting lecture. The County and Township have increased their grants, and we have distributed $68 in local field crop competitions. The prizes were divided into four classes, and four prizes in each class; everyone seems to be satisfied, and we are looking for good work and more members for next year.

*Toronto.*—The Toronto Branch held twelve meetings during 1914, of which eight were at the homes of some of our most progressive gardeners. These meetings were all very instructive, the programme for the year being as follows:

Jan. 3rd.—Labour Temple.
Feb. 7th.—Labour Temple.
March 7th.—Mr. E. J. Wilcox, Fairbank.
April 4th.—Labour Temple. Exhibit of greenhouse vegetables.
May 2nd.—Mr. A. Carltons, Lambton Mills.
June 6th.—Mr. C. J. Leaman, Todmorden.
July 4th.—Mr. John Tizzard, Humber Bay.
Aug. 1st.—Mr. R. H. Tier, Islington.
Aug. 15th.—Mr. Thomas Delworth, Weston.
Sept. 5th.—Mr. George Syme, "Tory Glen."
Oct. 3rd.—Labour Temple.
Nov. 7th.—Miller & Sons, greenhouse.

The meetings at Mr. R. H. Tier's and Syme Bros. were specially interesting, owing to these being two of the gardens in which Mr. S. C. Johnston tested the experiment of spraying to control celery blight, the experiment proving a success in both gardens. There were two meetings held in August, the meeting on the 22nd of August at Mr. Delworth's was for the purpose of showing the advantages to be gained by use of "Skinner System" of irrigation, with which it is possible to grow celery and other vegetables on almost any kind of soil.

These outdoor meetings are getting more interesting every year, and the attendance was large. The ladies of the homes visited provided ample refreshments, which were greatly appreciated. Mr. S. C. Johnston gave a very interesting address at our February meeting, illustrated by over 100 lantern views. At the April meeting a splendid exhibit of greenhouse vegetables was shown.

The annual excursion to Queen Victoria Park, Niagara Falls, was as usual a great success.

At the August meeting the following resolution was unanimously adopted: That a committee be appointed to interview the Commissary Department of Militia offering to give a carload of vegetables for use of that portion of the contingent going from the County of York and City of Toronto or otherwise, as the authorities may see fit, the committee to make full arrangements.

For the Soldier Boys.

The Committee got to work at once, and met with a very hearty response During the last week of August the Secretary notified all members that he had made arrangements for a car. The Canadian Northern offered to take one carload free to Valcartier, but when the vegetables were collected and taken to Cherry Street on Sept. 2nd, the Committee found that one car would not nearly hold all the growers had contributed, so the Committee had to get a second car, for which they had to pay $63 freight. The following is a list of produce sent: Canadian Northern baggage car contained: 207 bags roots; 326 baskets tomatoes; 10 odd bags; 200 doz. celery; 100 doz. cabbage; C. P. R. box car contained: 385 bags roots; 220 doz. cabbage. Unfortunately we do not know in what condition the vegetables arrived at Valcartier, as Col. Williams, the commanding officer, was apparently too busy to acknowledge the Secretary's letter. The officers have every reason to be well pleased with the year's work.

Mr. Thos Delworth was appointed delegate to attend the Annual Convention of the American Vegetable Growers' Association, and judging from the press

reports, he was given a cordial reception, and took an active part in the deliberations. His report, which will be given at this Convention, will, I am sure, be both interesting and instructive.

Co-operative buying and selling has been for some time receiving the attention of our members and of the Board. Many of the Branches have for some years been doing good work along this line and have saved their members many thousands of dollars, and in 1915 this very necessary and profitable line of endeavor will, doubtless, be continued on a larger scale by the Branches. While, on the whole, our membership is composed of business men, yet many of us have much to learn in co-operative work and economic community effort.

The vegetable grower or farmer who imagines that he can continue to do a successful business along individual lines is bound to have an uphill fight in the years which are to come. We must co-operate, or in other words, operate together, or success will not follow in our wake.

In the steps we have already taken in the wider field of co-operation, obstacles have been encountered and difficulties have arisen, but we will press on and surmount those rocky steeps which have momentarily delayed our upward climb. "If at first you don't succeed try again" is a motto which we should keep ever before us. Mistakes have occurred and will occur again, but I misjudge the substantial character of the members of this Association, if having set their hand to the plow they turn back. The executive will, doubtless, make a report on the co-operative effort of the year, and it will be up to the delegates at this Convention to devise ways and means for the continuation of this beneficial line of work.

The Field Crop Competitions inaugurated three years ago are proving of the highest educational value, not only to the competitors themselves, but also to the users of your products. This year is the first in which we have had four crops in competition, those selected being Tomatoes, Celery, Onions and Early Potatoes, and the exhibits at the Canadian National, Central Canada and London Exhibitions were the best ever put up by our Association. The Judges report marked improvements over the preceding years, both of the crops in the fields and the products at the exhibitions. The majority of the entries arrived in good condition. We hope to continue these competitions in 1915. Some of our Branches are doing excellent work holding local competitions of their own. This might well be taken up by all the Branches, and thus create a greater interest and educational value, while friendly rivalry is established.

There is at the present time, and has been for some years past, a multiplication of names of the same varieties of vegetables. The time has arrived, I think, when some action should be taken by our Association, through a Committee acting in conjunction with the vegetable experts at the Central Experimental Farm, Ottawa, and the Ontario Agricultural College, Guelph, to form a Committee on names and varieties with a view to definitely determining the proper names of different kinds of vegetables grown in Ontario. If you think well of the suggestion, after discussing the matter, you might name a suitable Committee.

When parcel post was first introduced into Canada, it was hoped that the consumer and the producer would be brought more closely together, but, unfortunately, up to this time, this desired result has apparently not been accomplished to any great extent. Doubtless, the Post Office Department will consider in the near future reductions that must be made in the rates and the extension of the low rate zones.

Exhibit of Welland Branch, O. V. G. A.

We have not been making much progress in getting reduced railway freight rates on our products. This should receive the attention of our delegates. The continued extension of the telephone system into outlying rural districts should prove a means of bringing the producer and the consumer together. Another matter which should, I think, be discussed at this Convention is increasing the membership fee to $1. The amount contributed to the Central Association should remain as at present, while the Branches would have additional funds wherewith to carry on their work. If we are going in for a wider co-operative movement it is of vital importance that each Branch have a reasonable amount on hand, in order to further its plans. The Association is to be congratulated on the work it is doing and greater good is in store for the members of our Association. I thank you, gentlemen, for the kindness extended to me during the year which is past.

## FINANCIAL STATEMENT.

*Nov. 30th, 1913, to Nov. 30th, 1914.*

RECEIPTS.

| | | |
|---|---|---|
| Balance on hand from 1913 | $123 58 | |
| Grant | 800 00 | |
| Entry fees for Field Crop Competition | 178 00 | |
| Membership fees | 94 40 | |
| Sale of potatoes from Ottawa exhibit | 10 25 | |
| | | $1,206 23 |

EXPENDITURE.

| | | |
|---|---|---|
| Cartage, exhibit at C.N.E. | $ 1 90 | |
| Stationery | 20 00 | |
| Stamps | 10 00 | |
| Organizing | 6 60 | |
| Expenses of delegates to Toledo | 15 95 | |
| Auditing | 5 00 | |
| Stenographic services | 15 00 | |
| Exchange on cheque | 10 | |
| Prizes paid in Field Crop Competition | 335 00 | |
| Expenses of delegates to American Vegetable Growers' Convention at Philadelphia | 42 20 | |
| Delegation to Ottawa | 36 60 | |
| Expenses attending Directors' meeting | 178 15 | |
| Expenses attending Annual Convention | 130 50 | |
| Executive meetings, services and expenses | 139 10 | |
| Express on potatoes from Ottawa | 3 25 | |
| | | $ 939 35 |
| Balance on hand | | 266 88 |
| | | $1,206 23 |

F. F. REEVES: As regards the raising of the fees to one dollar a year, I do not know how the rest of the Branches find it, but this is our experience in Toronto. We have a membership of about one hundred. Our monthly expenses are about $6, for printing, postage and rent. If you take what is left out of fifty cents and find out how far it will go to meet the expense, we are behind every year. If we did not have a very successful excursion which nets us from $75 to $125 profit we would have a deficit. Personally, I think that we would just have as many members if we made the fee $1.00 as we now have.

W. J. KERR: Each member of the Ottawa Branch for many years paid $2.20, and I do not know that anybody ever did any kicking about paying that sum.

At that time they were paying a rent of $20 a year for the hall in which to hold the meeting, and the membership got down to eighteen, and when we paid the hall rent of $20 a year and secretary's salary of $12 with other expenses, $2.20 was not enough. But we were fortunate in being able to get a hall free of rent, and by reducing other expenses we cut the fee down to $1. Any member of the Vegetable Growers' Association that will pay 50c. will pay a dollar. That dollar now gives us a surplus for use in our field crop competitions or any other way we see fit, and all Branches will find it very greatly to their advantage to have a surplus fund on hand.

The organization of new branches can be accomplished without very much effort. I have letters in my pocket at the present time, one from the western

Tomatoes on stakes in greenhouse.

end of the Province and another further east, to the effect that Branches can very easily be formed there, and asking for information about it.

The Secretary also spoke of the low prices and surplus of certain goods in some districts. While there are surpluses in one district, there are shortages in others. I had an enquiry made just before I left home for a carload of cabbage. I wrote my correspondent, and said I would bring the letter before the Convention here, and if anyone has a carload of cabbages for sale and gives me his name and address I will send it to him. I have also enquiries for onion sets both white and yellow for immediate delivery. If anyone has any of them or knows how any can be procured on quick notice, I shall be very glad to place them in the hands of the enquirers.

The President: You have heard the Secretary-Treasurer's report on the workings of the Association and also Financial Report. There is one thing that

he pointed out which always appeals to me, that is, to organize new Branches. There has not been as much done along that line as might have been done, and I hope in the future, whoever our Directors and Executive may be, that they will look into that matter and see there is more organization work done. I have seen some letters myself about organization of Branches mentioning the fact that they would like to become members. I would like to see a certain amount set apart each year, if possible, just for that work, so that if any names are sent in, someone may be sent immediately to enquire into it. We all realize the fact that some of the old Branches through various reasons sometimes die, and without recruits the ranks will dwindle. I would like to see that part of the work, particularly, taken up.

THOS. DELWORTH: There is one matter touched upon in the Secretary's Report that we should take into consideration, and that is the matter of seed growing. I do not want to forestall or speak of anything that Mr. Britton may have to say in regard to the work at Guelph, but I had a letter a few days ago from my son, who is in the freshman class there, and he told me that he had been for sometime under the direction of Prof. Crow in his spare time selecting beets and carrots, that they were going to use next year for seed growing purposes at Guelph, and he asked me to send him a quantity and he would take up the work next summer at home at the close of his College year. I was very pleased to hear that matter of seed growing taken up in the Secretary's report. It is a live question. This matter will be dealt with, possibly, through the day by other speakers in different ways. There have been quite a number of experiments of late in seed growing in Ontario. The Robert Sweet Company, at Waterloo, carried on some important work. I believe that Mr. Johnston who is here to-day is doing something along that line, too, particularly with onion seeds. I do not think there is any reason why we cannot make a success of growing our beet and carrot seed, apart from the one question of the cost of labor. We all know there is liable to be a shortage in the spring of 1916, and we can prepare for that this coming summer.

A DELEGATE: Do you not think the cost of labor will come down?

THOS. DELWORTH: I do not want to see that; I would sooner pay more for the seed. Even if the cost of labor goes up there is no question in my mind that the price of seeds will do the same. There is always this advantage, that you make your own selection or selection is made in such a manner that you know the stock from which the seed is being produced. You are not running any risk. You know when seed is scarce and price is high the tendency is to sell inferior stocks. By having this selection made under proper supervision we will get what we want, even if we have to pay a little more for it.

W. J. KERR: The experience of some of the Ottawa growers is that we can produce better seed than elsewhere. We have melons down there grown by one of our gardeners in particular, that he has bred up by selection for a number of years that cannot be beaten, and I doubt if they can be equalled. One difficulty crops up and that is in the method of cleaning. These large establishments, of course, can put in modern machinery for preparing seed for market. Now, if the Association could take the matter up in such a way as to provide this, one of the greatest difficulties will be overcome. So far as the labor problem is concerned, if we do have to pay a little more for home grown seed, so much the better for us. The money is left in our country.

Planting Lettuce.

*Photo. by Jas. Dandridge.*

A Fine Crop of Potatoes.

Chris. Quanberry: About raising the fee from 50c. to one dollar, it is hard to get Branches started in some places, and when you do get them they are harder to keep going than others are. It is an easy matter to approach a man and say it will only cost him 50c. and get a member. But if you charge a dollar, you probably will not get him at all. It should be left in the hands of the Branches to charge either 50c. or $1. It is up to them as regards the funds on hand.

J. Lockie Wilson: I do not think it would be advisable to have various scales of fees in the Branches. The fee should be uniform. You require funds to further your work. It is not as if that money was coming out of that particular locality. It remains there; it is your own money to be used for your own purposes. No man will grudge a dollar, knowing that 90c. of the money was to remain in the treasury of the local Branch for the purpose of the work that has to be done. You cannot get along without a reasonable amount of capital, and the vegetable grower is poor indeed who cannot afford to pay $1 a year membership fee to an organization whose sole purpose is to further his interests.

Geo. Philp: I quite agree with charging a regular fee all over the Province, but I would leave it with the individual Branch to get to work and hustle and make up the deficiency. It would create enthusiasm. Let them get up an excursion.

W. D. Ferguson: We raised our fee this year from 50c. to $1, and we got more members than we ever had.

Thos. Delworth: Is not this a matter that should be dealt with at the annual meeting of the Directors?

J. Lockie Wilson: I think Mr. Delworth has rightly intimated that this Convention could not definitely settle the fee question. At the annual meeting this matter will, doubtless, receive the attention of the delegates from the Branches.

Colin McNicol: There should be a uniform fee, and a dollar is not too high.

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## CELERY BLIGHT EXPERIMENTS.

S. C. Johnston, B.S.A.

Celery Blight is probably the worst disease that vegetable growers in Ontario have to fight. It is estimated that $10,000 worth of celery is a total loss annually to vegetable growers around Toronto alone. Many of the smaller gardeners have gone out of the celery business entirely on this account, and, as a result, their annual returns are considerably lower than when some celery, at least, was grown. For this reason it was thought advisable to carry on some demonstration work in spraying celery to prevent the disease, if possible. A survey of the district around Toronto was taken, and the plots chosen were those which were very badly affected during the seasons of 1912 and 1913. In all cases, practically all the celery grown during these two years was so badly affected that the sale was impossible. Some of these men had been in the practice of trimming the badly affected stalks and putting thirty-six heads in a bundle in which, ordinarily, twelve would be sold. Some growers went so far as to leave the whole diseased crop in the ground, refusing to dig and sell it as there would be no return for labor.

The Middlesex Branch of the Department of Agriculture was approached on the matter of carrying on similar work in the vicinity of London. This work was entrusted to Mr. J. W. Noble, Assistant Representative for the County, and all

credit is due him for the efficient manner in which the work was looked after in that County.

On the whole, if it were not for the hearty co-operation of the individual growers themselves the work would not have attained any results. Each grower did his part of the work faithfully and they had the largest end to do.

The following gardens were taken in charge:

| | | |
|---|---|---|
| Charles Dabbs, Mt. Dennis | 75,000 | plants |
| F. F. Reeves, Humber Bay | 10,000 | " |
| Symes Bros., Mt. Dennis | 50,000 | " |
| R. H. Tier, Islington | 35,000 | " |
| John Tizzard, Humber Bay | 10,000 | " |
| Sanderson Bros., Byron | 25,000 | " |
| J. J. Davis, Byron | 25,000 | " |
| A. McInnes, London East | 125,000 | " |

Portion of Celery Field of Symes Bros., Mt. Dennis. One of the Demonstration Gardens.

These men agreed to allow this work to be carried on and also co-operated by supplying the necessary horse and labor and in some cases the machinery. The Ontario Department of Agriculture furnished the materials, and helped with the work, and saw that it was properly carried out.

The Ontario Agricultural College and the United States Department of Agriculture have both recommended spraying with Bordeaux mixture as a preventative, to some extent, of the disease known as Celery Blight. Experiments have been carried on in large and small ways and good results have been given. Bordeaux Mixture and Ammoniacal Copper Carbonate were used on these patches and a brief description of what was used and how may be of value.

Bordeaux Mixture is made from 4 pounds lime, 4 pounds copper sulphate, and forty gallons of water. The lime is slaked, the copper sulphate or bluestone dissolved and the two added to the 40 gallons of water, care being taken to add the lime first. Stock solutions of these materials may be made and, if kept separate, will last some time and save much time and trouble. A given number of pounds of bluestone, say for example 30, are suspended in a bag in an equal number of gallons of water. When the bluestone is all dissolved one gallon of the solution will contain one pound of bluestone. Instead of dissolving the material as required one gallon can be taken out and the mixture made up. This may be done with the lime as well. If it is so desired, fresh material may be made ready as

Twelve row attachment with barrel in ordinary dump cart.

required. Both methods were tried through the season and the results showed no material advantage on either side, the main point being that considerable time is saved by using stock solution.

### Method of Experiments.

The plants were sprayed with Bordeaux Mixture every ten days from the time they came through the ground until the first week in September and some until ten days before the celery was sold or pitted. A "Knapsack Sprayer" holding five gallons was used while the plants were in the plant bed and various kinds of spray rigs used in the field. On the two patches of 10,000 each the knapsack sprayer was used in the field as well.

Four nozzle sprayers were used in the early part of the season and after the plants reached a height of eight inches a twelve-nozzle sprayer which sprayed both sides of the row as well as the top was employed. Plenty of force was used so that the spray went on in as fine a mist as possible. Besides the spraying, some plants were treated with from 500-1,000 pounds of Agricultural Lime per acre.

Ammoniacal Copper Carbonate was also used as a spray mixture instead of the Bordeaux. This was made by dissolving two ounces of Copper Carbonate in one pint of ammonia (fort) and making up to ten gallons. This was applied in the same manner as the Bordeaux.

Check plots were left in all cases to determine the value of the spraying and these were not sprayed during the season.

## Reports of Work Carried On.

J. J. Davis, Byron: In making this report I wish to make it clear that we have not been successful in all places. The experiment on Mr. Davis' crop was a decided failure. The plants were sprayed carefully, the mixture properly made and applied at intervals of ten days as directed. At the present this crop is in a very unsatisfactory state and we cannot find the reason as yet. Seventy-five per cent. of the plants are affected more or less. It has been suggested that the spray machinery did not put the mixture on in a mist but in big drops. While the crop has some appearances of this we cannot state definitely that this has been the cause of the failure. It is our intention to carry this work on again next year, and, if possible, secure more complete results either one way or another, as this year they are certainly very unsatisfactory.

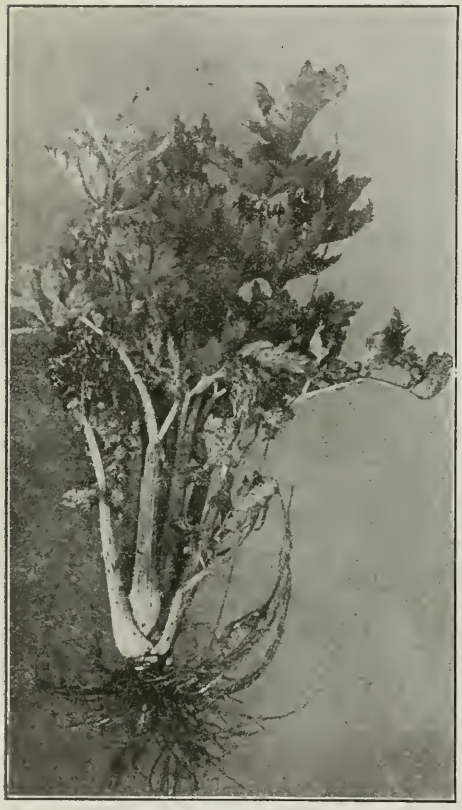
Sanderson Bros., Byron: This celery field constituted one and one-half acres under Skinner irrigation. All the plants were sprayed in the seed bed and all excepting four check rows in the field. About one-quarter of an acre of early celery was grown and was kept practically free from blight until boarded to bleach. Considerable time was required in the bleaching process, owing to the climatic conditions. About thirty per cent. of the plants became slightly affected with the blight, owing to the fact that they could not be thoroughly covered with the spray mixture during the time required for bleaching. Off the one quarter acre, $239.20 worth of celery was harvested, one of the best crops this firm has ever produced upon a similar area of celery.

The late celery covering about one and one-quarter acres is more free from blight than any celery they ever grew.

Fully ninety per cent. of this is unaffected by the blight and the plants attacked have very slight infection. The four check rows of unsprayed plants are practically all attacked more or less and fifty per cent. of these will never be harvested owing to the extent of the blight injury.

A. McInnes, London East: Upon the crop of celery we obtained satisfactory results. This field comprised six acres of celery and a better crop has never been produced upon the place, although celery has been grown here for several years. It was upon this field that we had the most efficient machine. A horse power spramotor with nine nozzles covering three rows, and costing $144 was used. Mr. McInnes plants his celery rows four feet apart with the plants seven inches in the row.

Seedling plants were obtained from another section to plant one and one-half acres of this field, and upon these plants were indications of blight. As soon as set in the field, these plants were thoroughly sprayed, and a great percentage of the blight disappeared under this treatment. Not more than twenty per cent. of the plants are at present (October 30th) affected with the disease, and these only to a limited extent. The remaining four and one-half acres of plants which have been sprayed since they were large enough to permit, are at least ninety-eight per cent. free from the disease. A check of two rows, each twenty rods long, was unsprayed and at least seventy-five per cent. of this will never be harvested, being so badly affected with the blight.



Unsprayed.

Sprayed.

**Celery Blight can be prevented by spraying with Bordeaux Mixture every week from the seed bed to the harvest.**

## Report on Work Done on Symes Bros.' Celery.

About 50,000 celery plants were taken care of on this garden. These were sprayed every ten days from the time they came through the ground until harvested. The results on this patch were very satisfactory. Six rows which were left as checks were so badly infected with blight that they were unsaleable, while the rows directly next to them were all sold with no trimming for blighted leaves. The plants always had a healthy appearance and the crop was over ninety-five per cent. free from blight. It may be interesting to note that a patch of celery

belonging to a Mr. Young was grown only ten feet away from this plot, there being only a few rows of lettuce to divide the two plots. The seed for the two patches came from the same source and the plants were put out in the field the same day, the difference being that Mr. Young's was not sprayed. This crop was practically ruined, the grower having to leave much of it in the ground and selling the smaller portion of it at a low figure. This field demonstrated satisfactorily the results of spraying. This patch of Mr. Young's was sprayed twice after it became affected to determine whether spraying after the disease had started would be of value. No effect could be seen.

**The two preceding crops on this ground were practically total failures owing to ravages of the blight. 99% of the plants were harvested last season after spraying.**

R. H. Tier, Islington: In this plot 35,000 plants were grown. These were sprayed every week and excellent results were obtained. The check rows left in this patch could not be distinguished from those sprayed on August 1st, but by the 1st of September a marked difference could be seen. Considerable trimming was necessary to be able to sell these rows at all. Parts of the rows left until the end of the season were unsaleable.

Chas. Dabbs, Mt. Dennis: On over 75,000 plants we can here report over ninety-eight per cent. good celery, it being practically impossible to find a diseased head where the celery was sprayed. This plot showed clearly that we could grow good celery free from blight.

Mr. F. F. Reeves and Mr. Tizzard, of Humber Bay, having a smaller acreage of celery, employed the ordinary knapsack sprayer on their plots and the results were not as satisfactory as those on plots on which the better sprayer was used. Even though the work was thoroughly done with this form of sprayer there was about ten per cent. blight in these plots. This did not necessitate the loss of the whole crop and good results were shown from the sprayed over those which had no spray.

Ammoniacal Copper Carbonate was used on some plots towards the end of the spraying instead of the Bordeaux Mixture so that no fault could be found by the buyers on the market. This material gave equally as good results as the

Twelve nozzle attachment with barrel on platform, constructed on two cultivator wheels.

Bordeaux and its drawback is principally that it leaves no trace of where it has been put on and for this reason one cannot tell whether all the leaves are covered or not.

Lime: As stated above several plots were limed with from 500 to 1,000 pounds of agricultural lime. This was spread on from a dump cart and thoroughly harrowed in. Careful observations of the crop can give no reason for saying that the lime prevented the disease. In rows of unsprayed celery where lime was applied to one-half of the row only, the disease made equal inroads on limed and unlimed. One grower claims that the plot on which the lime was applied was later for market by one week than the unlimed, other conditions being equal.

Cost per Acre: By careful keeping of records of time and materials in this work we estimate the cost of spraying one acre of celery from the time it comes through the ground until it is harvested at from $10 to $15. Where the plots are large, this can be cut down somewhat as, once the spraying is started, a large piece of land can be gone over in a short time. The full detailed cost of operations on one and one-half acres may be of interest.

| | |
|---|---|
| 70 pounds lime at 40c. per bushel | $0 40 |
| 70 pounds bluestone at 7c | 4 90 |
| 3 pints ammonia at 25c | 75 |
| 5 ozs. copper carbonate at 25c | 08 |
| Manual labor, 52 hours at 15c | 7 80 |
| Horse, 40 hours at 10c | 4 00 |
| | $17 93 for 1½ acres |
| | 12 00 for 1 acre |

Points observed while on work.

1. Spraying thoroughly at least every ten days is necessary to success.
2. Spray every two days in hot muggy weather, as disease spreads rapidly.
3. Spraying in seed bed makes plant free from disease and seems to give greater vigor.
4. Only spray machinery which gives sufficient force to apply mixture in a mist is to be recommended.
5. It is advisable and almost necessary that plot should be sprayed twice on same day thus ensuring complete covering of leaves.
6. Thoroughness and regularity in spraying are essential.

## Results of Experiments as a Whole.

In spite of the fact that experimental work of one season's duration is usually considered to be of little value and we had unfavorable results on one plot, it is possible to report a successful season's work, and taking all things into consideration, it is safe to state that Bordeaux Mixture this year gave excellent results in controlling Celery Blight. It is hoped to carry this work on for a period of five years and by that time we will be in a better position to report results.

G. Philp: What is the cause of this blight?

S. C. Johnston: It is a fungus disease.

G. Philp: Have you any experience in using lime and sulphur?

S. C. Johnston: The lime and sulphur was used at the Ontario Agricultural College the year before last, and the result was not as satisfactory from it as from Bordeaux Mixture.

Thomas Delworth: In regard to the cost of operations per acre, I think you placed too low an estimate on the cost of labor; that is to say at 15c. an hour. We cannot get men at that price in the summer time. A horse during the working season is worth more than 10c. an hour. Even in that case it would not affect the total cost so much. I think the cost of labor should be increased a little.

S. C. Johnston: How much would you say for a man in the working season?

Thomas Delworth: 20 to 25c. an hour.

S. C. Johnston: How much for a horse?

Thomas Delworth: 15c. an hour. That will not increase the cost of operations very materially.

Crop affected with blight.

A crop showing the benefit of spraying.

S. C. JOHNSTON: Even were the cost of spraying doubled or trebled it would be a cheap insurance against losing the whole crop. There are two men here on whose place spraying was carried on and another who can give you some idea of what has been done at London.

A DELEGATE: You spoke of one sprayer doing the work a good deal better than another. I would like to know what that sprayer is.

S. C. JOHNSTON: One of those sprayers that works from the wheel by a compressed air attachment seemed to me to give the best results in that locality. As I have stated it cost $144, and could be used on practically anything from vegetables to fruit trees.

C. QUANBERRY: What is the name of that machine?

S. C. JOHNSTON: The Spramotor. The machines that we used on two places were ordinary No. 2 Spramotors. If you were 100 feet away from the machine the spray just looked like a fine mist, no big drops going out from machine.

A DELEGATE: How about rust?

S. C. JOHNSTON: That is a different thing altogether.

A DELEGATE: How do you treat that?

S. C. JOHNSTON: I do not know that you can do anything except keeping the earth away; when you bank with earth there is more likelihood of getting rust than at any other time.

F. F. REEVES: What rust is that? Rust on the stalk?

S. C. JOHNSTON: Yes.

F. F. REEVES: It is caused from blight; you do not get rust unless you have the blight.

A DELEGATE: I think the nature of the earth causes rust in the celery.

JOS. RUSH: Rust on the stalk is caused by handling it when it is damp. If you handle it when it is wet you are apt to encourage the rust.

F. F. REEVES: Before this discussion is closed, as I had a small patch on which the experiment was tried, I would just like to make a few remarks. There is no doubt in my mind that this spraying controls the celery blight. I have done it for the past four or five years, although I never did it as thoroughly as this year. Before this year we used to spray when we had time. Sometimes we would not have time for a week or two, and then might spray several days in one week and try to catch up in that way. That is no way to do it. This year we sprayed every Friday morning and it was a decided success. The great way to find out whether a thing is successful or not is the financial end. About ten or twelve dozen of the rows that we sprayed averaged fifty to a row. The unsprayed row gave between nine and ten, and there was three times as much labor in cleaning it up, and after it was done I had to rake every bit of the blighted stuff away in case I should plant there another year. If I can by spraying with a little labor save that much, I am certainly going to do it. The sprayed portion of mine was not absolutely free of blight, for one good reason that I had not enough ground under celery to make it worth my while to get a big power sprayer, and I used a knapsack sprayer. It is a good machine for this work, but it has not the power to get thoroughly into the leaves and heart of it as it should do, and the consequence was there were some few places where there was blight on the sprayed portions. Except for that, as I said before, the sprayed rows were worth five times as much as the unsprayed.

In regard to the lime, I have added lime to the soil, but it was to correct a little sourness there was in it, and it helped it along wonderfully.

The experiments carried on by Mr. Johnston, so far as I have seen, have been a success. I have not seen Mr. Davis's crop, which I believe was a failure. Mr. Tier is here, and he can speak of his own. I can speak about Mr. Symes'. We had a very interesting meeting in August, and we were perfectly satisfied on the success. Mr. Symes has a good celery swamp, but last year they could hardly market the celery at all. They had to tie about six little hearts into one bundle to make a good average size. This year they marketed every one except on the unsprayed portions. It was certainly a good lesson to anyone who had any doubts about spraying to see the difference between sprayed and unsprayed.

R. H. Tier: I am one of those who conducted experiments in co-operation with Mr. Johnston. I had 35,000 heads of celery on land on which I have been growing it for the last 35 years. The blight was not known until two years ago, when we had it so bad that I was ashamed to acknowledge it. It took very much longer to trim it; in fact, could not trim it to make it look decent at all. This year I could go out into my patch and in three hours get a splendid load of celery, because I had one of the best crops of celery I ever trimmed in my life. Twenty-five per cent. of my load every day I sold at 75c. a dozen. I can fairly say that the spraying done this year by Mr. Johnston and myself was thoroughly satisfactory to us. As long as I grow celery I am going to spray. I have a Spramotor No. 2 pump. I do four rows at a time, throwing a nice spray; it takes two of us to work it and in an hour I can go over all the plot. We go up four rows and come back the same four rows.

The President: This is a very important subject, and we will all admit it is one of the best things that the Association has ever taken up, and we are glad that the Department of Agriculture has seen fit to help us. There is no doubt that it will save us thousands of dollars in the coming year. The consensus of opinion seems to be that spraying is all right. No doubt many of you will carry the good news home.

J. H. Bennett: As President of the Ontario Horticultural Association it affords me very great pleasure, indeed, to extend to you the cordial greetings of the Ontario Horticultural Association. Both Societies are engaged in tilling the soil; you gentlemen in, perhaps, a manner that is of more benefit to the community at large from a commercial standpoint than those of us members of the Horticultural Societies of this Province who cater more to a sentimental taste. But I can assure you that the work that we are doing by both Societies is in the best interests of the community at large. And I can only repeat that it affords me very great pleasure to convey to you the greetings of the Ontario Horticultural Association.

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## REPORT OF DELEGATE TO AMERICAN VEGETABLE GROWERS' CONVENTION.

Thos. Delworth, Weston.

I appreciate very much the honor that you did me in appointing me your delegate to attend the Convention that was held in Philadelphia last March. There were about 350 delegates registered, coming from fourteen or fifteen different States in the Union, and one other besides myself from Ontario. One of the first things on the programme was the Reports of Committees, and under that head

Mr. Waid, whom some of you remember as being present at one of our Conventions some three or four years ago, reported on Standardizing of Weights and Measures for vegetables. That is a matter we worked on for some years until we got results. They have not got results yet, and they are not likely to do so for some time to come. Adjoining States have different weights. One would have a standard of 56 pounds for a bag of onions, and just across an imaginary line another would have 50 pounds for a bushel. He concluded by stating that they had no relief in sight, but thought that the Committee might be kept in office another year to consider the matter. Mr. Waid asked me how we were getting along in Canada. I said, "We did better than you. We got all we want.

Twelve nozzle sprayer showing arrangement of nozzles to throw spray between the rows as well as on top.

We have a better Association than you have, with a little more life in it: we got after our Government and stated the case and they gave us a Bill which is in force, and we have a standard weight for a bushel of vegetables all through the Dominion." He was somewhat staggered and asked me if I would mind stating it to the Convention, and I said, "Certainly not." So at the close of his address I was asked to state how matters are in Canada, and I had a very good reception, and it aroused considerable enthusiasm there and a great deal of discussion afterwards. They are in a very much worse condition than we were before we got the legislation which we have.

The matter of seed inspection and registration was dealt with there by Prof. Orton, of the Department of Agriculture of Washington, D.C. He showed

that there was a great deal of unsatisfactory seed being sold, and a great deal of confusion with regard to types and varieties. He thought where seeds were grown in the United States something could be done along the line that our Secretary suggested for Canada this morning, that a committee of the Association might be formed to act in conjunction with some of the officials of the different United States experimental stations and some of the officials from Washington, to adopt a uniform type for different varieties of vegetables, and that seeds that were grown might be inspected while they were being grown, and if they were found satisfactory, certificates might be issued to the grower somewhat along the same line that is being carried out by the Seed Growers' Association at

Four nozzle attachment used during early stages of blight in field.

Ottawa in regard to grain. Seeds would be sold under those certificates, and when one bought that seed one would get registered certificated seed. Nothing was done, however. The suggestion seemed to be good, and the Committee was continued in office another year.

They also have a Nomenclature Committee there which is doing good work, and when its work is completed a great confusion of names of many varieties of vegetables offered for sale will be avoided.

To illustrate this, if I go to a seedsman in Toronto and I buy a packet of Hanson lettuce, to another for Nonpareil, and still another for Market Gardener's Favorite, all of you Toronto market gardeners know that if I sow that seed I will get an identical crop so far as variety is concerned. Knowing this what are we going to do about it?

Our American friends have no legislation to enforce any rules they may adopt, and the only hope of getting any redress seems to be through inducing all the seedsmen to come together and decide to cut out all this multiplication of names. Dr. Tracy, of Washington, who was on one of the committees, pointed out some of the difficulties in the way. They thought that they should adopt a rule similar to that of the Pomological Society, that each variety of apples should have a name to be adopted by all. For instance, a Baldwin. Every Baldwin apple tree is merely a reproduction of the original Baldwin apple tree, but when you come to a vegetable grown from a seed you have a new individual, and the type may change in spite of the fact that the grower may be doing all he can to retain the original type. Dr. Tracy said that many years ago a grower got out a very good variety of seed corn. Dr. Tracy visited his place and saw the corn and asked the man to select from the pile of cobs what was his ideal for that variety, and he did so. He said some ten or twelve years after he visited the same grower still growing for sale what was supposed to be the same variety of corn under the same name. He said the corn did not look at all like the variety that he got ten years before. He asked the man to select for him what was his ideal cob, and he picked out for him a cob of very different shape and appearance. Now, that was a gradual change that had come about from year to year in those twelve years, not only in the variety of corn but in the grower's ideal of what that corn should be like. You will see some of the difficulties in the way of getting a solution of this problem. This is not to say there is no solution for it. It merely shows some of the difficulties that will have to be overcome and are in the way of standardizing or getting a definite fixed standard for any variety of vegetable. Standards change and varieties change in spite of all efforts to the contrary.

Another matter dealt with was that of co-operative buying and selling. This was dealt with in a committee report by Mr. Paul Work, of Cornell University, at a round table discussion that went on for some time as to the best means of adopting this plan. The keynote of Mr. Work's recommendations in the matter was this: To start on a small scale and build up. If you start in a large way you will meet difficulties and very likely disaster. Be contented to start small. He told of a great many cases where co-operation had proven a success, and in almost every case it meant that two or three men got together to carry on a certain line of work and they had done it successfully and the work had grown. In a great many cases cited where a large number of people got together or where people got together and attempted something big they got beyond their depth and failed.

Another matter was better marketing of products. The main thing seemed to be to try and deal more from farm to family direct. They had an official there from the United States Postal Department with regard to parcel post, explaining how they could ship by it. That is all right for some lines of goods, but in a great many of our products the postage comes to a great deal more than the cost of the goods, so that it is not applicable to very many of our products. They seem to be using a larger package for parcel post there than we are here.

A rather novel suggestion—though by no means considered a new one—was made by Mr. Sprankling, of New Jersey, a grower there who shipped household packages. This was almost the same as shown by Mr. Fullerton, of the Long Island Railway, a few years ago. It is simply a six carrier crate. They hold six small baskets; each basket containing about four quarts. Three baskets go in the bottom layer and then a slat goes in and three baskets on top and cover

is nailed on. Mr. Sprankling had got these baskets, and he took six of them and filled one with carrots, another with cabbage, etc., and nailed it up. Now, that is a household supply of vegetables supposed to do an ordinary family for a certain length of time, and they can have that filled at any time. The grower can put in string beans or any vegetable as it comes in season. As to the best way of selling these: He proposed first to send out circulars covering a certain district. Philadelphia is a city of about a million and a half population. He is going to take a certain district in that city and deliver a circular to every house in that district, describing this box and what price it was being sold at. My recollection was it was to be sold at 50 cents.

After doing that he would send an agent through that district to solicit trade. He could only make the deliveries by taking certain districts in the city on different days. Then his waggon or motor truck would go into that

Onions in field; in rear, crib driers.

district on one day and another district on another, and deliver those packages. They were not selling stuff off a waggon, and every package delivered represented 50 cents worth sold. The grower would have the privilege of putting in that package what vegetables were in season at the time the order was received. What success will attend that I do not know. It is a new idea. Mr. Fullerton tried it out some time ago; whether he has been successful or not I do not know. It is a question whether the householder will allow the gardener to send him what vegetables he thinks best. When that package is delivered it can be returned any time by dropping a post card or they can tell the driver of the waggon to call or send a telephone message. That is a way of eliminating the middleman and dealing from farm to family direct.

They had there, too, a large number of trade exhibits. Another part of the hall was given up to exhibits of manufacturers and supplies. One of the most interesting was the United States parcel post. They had a large exhibit

there of different packages showing the various sizes they could put up, rates, etc. It was a very interesting exhibit. The various greenhouse construction companies also exhibited. Another rather interesting thing was what was shown as the Diamond Brand Compost, New York Stable Manure Company, showing dried and ground stable manure, a rather novel idea. They get stable manure, dry all the moisture out of it and grind it. Then they claim that by actual analysis one ton of that is equal to five tons of rotted manure or nine to twelve of ordinary fresh manure as it comes from the stable. This is stacked up and sold as fertilizer at $3.80 per ton for carload lots f.o.b. their shipping point in New Jersey. I have not the circular with me, but if anybody wants it, if they will leave me their name, I will hunt it up and give them the address of the company. It is a very nice, clean way of handling it. The freight rates would be very high unless we got carload lots. I do not think there is any duty.

Another new thing I saw there was an everbearing strawberry. I saw the other day that somebody in London had a quantity of strawberries on the market. A company in New Jersey claim to have got out a variety that is everbearing and will bear all summer, and you can have a big crop in the fall if you like to pick off the blossoms in the summer time.

Then the different irrigation companies took a large place in the exhibits, and seemed to draw more attention than anything else there. Irrigation, no doubt, is the live question to-day. A very short time ago we were limited to the Skinner irrigation. Now we have the Skinner, the Manaway, the Irrigation Supply Company, of Grand Rapids, Mich., three firms offering practically the same thing. The method of applying the water in all three systems is practically the same. Then we have the Campbell Irrigation System which is altogether different. You know how the Skinner operates with overhead pipes with nozzles scattered along the pipe distributing water. The Campbell system is an upright pipe with whirling arrangement something like our lawn sprinkler placed on top of the pipes, and these pipes are placed in the ground from 45 to 50 ft. apart. Every 40 or 50 ft. along the main is an upright with this apparatus which will distribute the water a radius of 40 to 50 ft. It has one very serious drawback. The manufacturers in all Skinner lines claim that the main thing about irrigation is to put the water on slowly in a fine spray no faster than the ground will absorb it; they use about 40 gallons per acre per minute with the Skinner system. I had a talk with Mr. Skinner myself, the originator of this thing, and he claims the biggest mistake ever made in irrigation was to think they wanted to put water on fast. Now, while all the Skinner systems apply from 40 to 50 gallons of water per acre a minute, the Campbell system uses from 100 to 150 gallons per acre a minute. To my mind that is a serious drawback to the latter system, but I am not pronouncing definitely on it.

Another very nice feature in their display was exhibits from the different agricultural colleges and experimental stations. We are very pleased to have representatives from our own experimental stations and colleges with us to-day. I think that another year, if that could be arranged, it would be very nice if we could have exhibits from them too. They had exhibits showing the work which was being done at these places, which were of interest to vegetable growers.

Cornell had an exhibit showing the courses of study they were taking up in the line of vegetable growing. This would be a very good work, and I hope the time is not far distant when we will have every facility for short courses in vegetable growing in Ontario. We need it. Most of us, even our younger

men, cannot give the time for a full course at Guelph College, but many could take up a short course, and I think this would be a good thing.

There was a display of vegetables made by the local associations. In point of quality shown I think we can beat them easily. There are some vegetables grown down there that we do not grow here which are very interesting. I saw a variety of parsley with a root like a turnip—turnip rooted parsley I think they called it. Another thing is Chinese cabbage which is sold for salad. But further than that I did not see anything very striking. There was also an exhibit of the Burdee Tyer Company, that some of you saw. I have one at home and have tested it out pretty thoroughly. The different seed firms had exhibits there too.

Now, I come to, as far as I could see, one of the best parts of the Convention, and that is inspection trips to different gardens in the neighborhood. Our first trip was out to the Bustleton market garden district. Part of it is inside the city of Philadelphia, and it was interesting to notice their methods, some of which are different to those we adopt here. I may say that they apologized for the appearance of their crops this year. They have had an almost unprecedented drouth in that district all this summer. I saw a case of celery that did not have the blight, but it had suffered from drouth and for some of it I would not care to give $10 an acre.

One of the first places we visited belonged to David Farrell. This man has specialized in cold frames. He has 2,500 ordinary 3 by 6 sash that he uses for cold frames; no manure under them at all. Of course we have to make allowance for the climate which is slightly warmer than ours. Under these sash he was just getting ready to sow when we were there. He sows lettuce seed 10 inches apart, something like our friend Mr. Rush sometimes does. These operations were under way. He makes a hole in the centre of every square, and goes over that before August again and puts a few seeds of carrots or beets in every one of those spaces, and when the cold weather comes on in the fall the sash are put on tight and they are left tight all winter and not opened up at all. The strange part of it is that these do not get winter killed. They stand all right. As soon as the warm weather starts in the spring they begin to grow, and he gets a crop of lettuce off first, and then a crop of beets comes out after, and that is how that man practically makes a living, and he appears to be making a good one out of those 2,500 sash. It is a novel idea: I do not know whether it would work in this climate or not.

Right across from him a man named Shallcross had been doing some experimenting in sub-soiling by the use of dynamite. He had a large patch of celery, perhaps 20 to 25 acres, and one part of it, some four or five acres, he was dynamiting last spring. So far as we could see there was no difference whatever in the crop in the dynamited portion from the other. Of course, as I stated a few minutes ago, they had a very dry season. He claimed the benefit would be shown in a wet season and not in a dry one.

Jos. Rush: What sort of soil is it?

Thos. Delworth: It is clay loam. This dynamiting was done by going over a field and making a hole with a crowbar about 3½ inches deep about every ten feet in squares ten feet apart, and putting in half a stick of dynamite and firing it. He said it would loosen up the soil and provide better drainage and allow the moisture to arise and drainage go down. I could see no benefit from it. He admitted that he had no benefit in his crop this year.

The next place visited there was the Crowley Brothers, where we saw some 25 or 30 acres under Skinner irrigation. Now, I told you before that for the celery I saw I would not give $10 an acre. This was quite an exception. I would certainly give a good many ten dollars for that, and would be glad to do it if I had it here. There were some 25 acres. Two brothers live across the road from each other, and each one had 25 acres under irrigation, mostly planted in celery, and looking very nice. It was planted in rows 8 in. apart, with a close planting system that some of you have tried out, and it bleaches itself in that way. A part down in the middle of the patch I thought looked rather bad. He claimed it had been overwatered on one occasion. The rest of the celery looked very good.

The next trip was to Bridgeton. I think the Skinner Irrigation Company was very largely responsible for the expense of this trip—40 miles by train and 40 miles by automobile. The trip out to Seabrook Bros'. farm at Bridgeton was

$1,300 worth of vegetables sent by Toronto Vegetable Growers.

worth while. The farm had 230 acres, planted with vegetables, and between 75 and 80 acres of that is under Skinner irrigation. There was a stream across the farm which was dammed up and made into a small lake, possibly an acre and a half in extent and four feet deep, and water is pumped from that with a 50 h.p. gasoline engine. When I was there they had thirty-five acres sprayed at the rate of about 3,500 gallons a minute.

The most interesting thing on this place is the crop rotation and inter-cropping. Mr. Jas. Seabrook said that the first crop he took off there in the spring was spinach that he sowed last year. Then he put in Irish Cobbler potatoes and got them off early in July. Then he planted strawberries. He grows the Chesapeake strawberry in double rows, like some people plant celery, plants 10 inches apart each way, alternating the two rows. He plants strawberries for next spring's crops. Then in between each row of strawberries he had two rows of Romain lettuce, every inch of the ground being used. The first crop is spinach. The

second crop potatoes that yielded him about 700 baskets per acre. The third crop is going to be Romain lettuce, and he had a crop of strawberries to come in next spring. In all under irrigation there were about 25 acres of Boston lettuce when I was there. I saw a rather novel way of hoeing. This Boston lettuce is planted a foot and a half every way all over the patch. A gang of Italians, about twelve or fifteen in number, were hoeing, and I never saw hoeing done that way before, but it is not a bad idea. They walk backwards and when they get through there is not a footprint on the whole patch; they start at one end of the patch and work backwards. They use an ordinary hoe.

This business has grown from small beginnings. Mr. Seabrook started there not many years ago on a farm of 20 acres. The man that was on that farm before failed and the place was taken from him under mortgage. The secret of their success is intensive cultivation, and every foot of ground counts. I did not see a foot of waste ground on that farm, and all the weeds on that farm I could have carried on my arm. They have a large market, selling mostly to New York and to Philadelphia, everything being sold wholesale. Their main crops are as I have stated, and Chinese cabbage, one side line that he is handling a lot of. They make quite a success of strawberries; grow Chesapeake under irrigation, and sold $12,000 worth last fall off 15 acres, all grown under irrigation. He got 20 cents for his strawberries when strawberries were going begging.

Mr. Seabrook himself is one of the most unassuming men. I had the pleasure of talking with him several hours after the trip, and I was delighted with his methods.

Then we visited the farms of the Minch Bros., this being where the very opposite methods are adopted. They are extensive growers, having some 900 or 1,000 acres in various farms scattered all through the country. We had to go a number of miles from one farm to another. They are very large growers, but use no irrigation or anything of that sort. Everything is done in a large way. The Sunny Slope Farm has 120 acres. There are 95 acres of that in peaches. In between the peaches they have these crops growing: 25 acres in peppers, in one block; 8 acres in rhubarb, 10 in onions, 10 in string beans, and 20 in corn.

Another trip was to Mr. C. W. Skinner's farm of Newfield, N.J. Mr. Skinner is the originator of the Skinner system of irrigation. He is not with the original firm now. He has started another firm that is called the Manaway System. We visited the farm and looked over it, but I must say that I am not very much impressed with it. He is adopting the suspended method of placing his pipes in the field instead of supporting them on apparatus. He has large poles like telegraph poles at each end of the field and a cable stretching from one to the other, and the pipe is suspended from that cable. He claims that he gets away with the pipes that are in the way of the plough. He claims that he wants those posts, with ordinary upright posts one every 16 to 18 ft., and he has them 150 ft., and you have got to leave a strip that you cannot plow. Further than that, it is very much more liable to get out of condition, and takes a great deal more to keep it in repair.

In all these trips I was impressed with one thing, and that is the good roads down there, and the larger growers are very large users of motor trucks. The country is older than ours, and I think that every vegetable grower should be an apostle for good roads in this country. There is no class of men to whom good or bad roads make so much difference as vegetable growers. They take more weight to market than any other class of producer, and have to haul more back.

I don't think we have anything to learn from them in their way of marketing. Most of the large growers deliver the stuff on motor trucks or wagons to commission houses, which then handle it to the retailer. They have no city market there. The Philadelphia and Reading Railway conduct a rather large retail market, and its stalls are rented to the farmers. They also have a cold storage plant in the market, and the farmer can rent bins in this cold storage plant as well. I did not see anything in their method of markets that I thought was worth copying.

Windbreak.

## CO-OPERATIVE BUYING AND SELLING.

F. C. Hart, Toronto.

The subject of co-operative buying and selling is a very important one at the present time, and is engaging the attention of people in all kinds of farming. The history of co-operative buying and selling presents many pictures of failure and success. In Europe, where we hear so much about co-operation, in their earlier history they passed through a long series of failures and difficulties. We do not hear of these things at the present time; but, practically, only of their success, what great things co-operation is doing for them. In this country, apparently, we must pass through the same way of learning the business of co-operation. We are going to make mistakes, and we are going to profit by our mistakes. The only way to do it is to go at the business and so learn.

There are certain reasons why co-operation should be slow in growth. In the first place, it is a business in which a large number of men are partners. In

a commercial concern one or a very few men are in absolute control of the business. In a co-operative concern, however, every member has an equal voice in the policy of the business concern. And it is a very difficult matter to get a large number of men to see the business aspect of any undertaking, and, because of that difficulty and because the great body of us have not the true co-operative idea, it is necessary to start in a small way and to progress slowly and surely. As has been pointed out by Mr. Delworth this morning, practically all schemes starting on a large basis have failed because the large body of men have not the true co-operative idea and the thing has fallen down. And for that reason I say it is a matter of necessarily slow growth. We have not in this country a large enough body of men who are willing to give and take in a co-operative concern, to take small losses at the start with the idea of forwarding their business. When a co-operative association is started the majority of members want to see definite results immediately. When they do not come, then they claim that co-operation is no good, instead of looking at it as a business proposition in which they have to take their chances as in any other business. But the reason why we have not progressed faster or more quickly is because the business of farmers is largely done in an individual way and we are in a business that leads us to look out for ourselves and have not acquired the habit of working together. Co-operation is simply a group of men who trust one another doing business together. And I want to emphasize the importance of trusting one another. Two men going into a business partnership would not do so if they had not faith in one another, if they did not think each other was honest, and the same principle holds true in regard to co-operation. You do not want to go into a business partnership with your neighbors if you think those neighbors are not honest and truthful in their dealings. And that is another reason why co-operative associations should be slow in growth. Start with a few men who can work together, taking in only those who can work with the Association. Start in a small way. You are apt to get into the Association different groups, men of different ideas, who should not be in the association at all if it were properly organized. And so in every co-operative association there is necessarily that moral consideration.

And the next important point is proper organization. This organization may be either simple or more elaborate, according to the business undertaken. But there certainly should be some kind of an organization, and that organization should be adequate for the business to be undertaken. There should be a clear understanding on the part of all concerned of what is to be attempted, and certain rules and regulations should be laid down and should be lived up to. A large organization going into business in a fairly large way and doing thousands of dollars of business should certainly have a constitution and be incorporated so that any difficulties cropping up get settled in a legal way. An association doing business should certainly have sufficient capital with which to do business. That is not true, perhaps, in buying supplies, which I will mention a little later on, but in most of our co-operative associations which are going into business it is necessary to have capital. So many of them have endeavored to start in business without having that necessary capital. Now, all commercial concerns must have capital with which to do business. They figure on paying interest on their capital, and in selling their goods they charge profits so as to pay interest on that capital, and you in dealing with them help to pay the interest on that capital. You practically supply them with the capital or means of obtaining capital when you do

business with them. When you go into business you must do exactly the same thing as any other business concern should do, and acquire capital, and, of course, pay interest on it. If you are supplying capital yourself personally, pay yourself personally interest out of your profits, or make arrangements that there are returns to pay that interest. A concern should also, to make itself safe, have a reserve fund, so that when difficulties arise the Association is not driven on the rocks. Another instance of members not having a true co-operative idea and business instincts is that they want their returns immediately. The Association in the first year of business wants to make a large showing, or they endeavor to give back large returns to its members, instead of putting a little aside so as to meet difficulties. When difficulties arise, and something goes wrong, as something surely will, the Association breaks down altogether and co-operation is discredited in that neighborhood.

Another extremely important point is acquiring the services of a business manager who is competent. I will, perhaps, mention this in a little more detailed manner later on, but one of the most important things is to acquire a business manager who is a business manager and not a producer primarily. You should not trust to the directors, no matter how efficient they may be, but the directors should actually direct. There is this further point to bear in mind, that a co-operative concern is in business, and as such must run the usual business risks. And if in going into co-operative concerns you are not willing to take those risks, then do not join co-operative associations. In doing business with other concerns they take the risks, and they charge you on the basis of risks involved. In doing your own business there are risks just the same and you should make provision for them, and, if you occasionally meet reverses and adverse conditions, these are to be expected and should not be entirely discouraging. In spite of drawbacks, however, to successful co-operation in this country it is surprising how many co-operative associations are at work in the Province at the present time, both buying and selling—in selling more largely than in buying. Most of them that are doing a successful business have started, like the associations in Europe, in a small way, and, as their experience grew, their business grew. Co-operative buying of supplies is a much less complicated process than selling. However, there are difficulties in the way here that I have already pointed out in proper organization that should receive more serious consideration. There are serious difficulties encountered even in the simple process of a number of men clubbing together to buy their supplies. It may happen in the smallest transaction. I heard of a number of men who wanted to buy cream separators. They clubbed together their orders and ordered them. One of the men, when the separators arrived, decided that he could not afford a separator, or did not want it for some reason or other, and the secretary was left with a cream separator on his hands. The whole system, that simple little process of buying their separators together, was unsatisfactory. There should be some business safeguard there so that each member should be required to live up to his obligations, and in any co-operative transaction it should be organized in such a way that every member is required to bear his share of the responsibilities, both moral and financial. Do only what you know you can do at first, and then go ahead. Farmers' clubs over the Province of Ontario are doing a good deal of co-operative buying in a simple way. An instance just comes to my mind of a farmers' club at Preston buying its seed in a very simple way. They simply, through their secretary or through a committee, gathered in the orders of the members for seed some time during the winter, and that committee procures

samples of seed from all local merchants and places the total order with the local merchant. The local merchant orders the seed, and has it all supplied there in his store, and he furnishes each member with the seed that he has ordered. The club simply hands over the list to the local merchant, and he divides up the seed and makes collections at the stipulated price, and he is willing to do this at a very reasonable price, because all of that seed is sold before he buys it. He does not have to run the risk of laying in a large stock, and not selling part of it. The whole order of some $800 or $900 worth of seed is sold before he buys it. So that all he wants is pay for the work of dividing it up and making collections. This does away with all that detail work on the part of the secretary, who is not used to it, and bookkeeping and keeping things straight. The merchant has facilities for doing that whereas the committee has not. And that system of buying on a small scale is very satisfactory.

Cucumbers under glass.

Another farmers' club in Hastings County, the Minto Farmers' Club, besides doing a lot of selling, also has a purchasing committee. They make arrangements to obtain an advance from the local bank so that they can buy for cash and also pay cash when they are selling their goods, pay their members cash when goods, live stock, etc., are delivered. That is another simple method of organizing on a small scale.

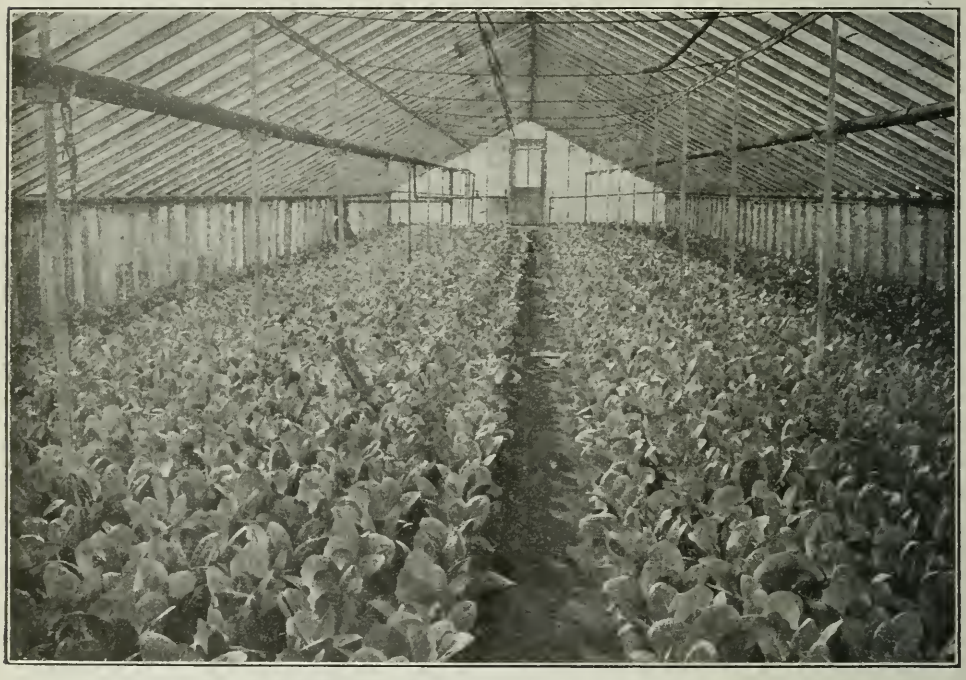
Larger Associations, however, have an organization especially for the purpose, and they have their capital and their reserve fund, and their whole business organization built especially for doing a large business.

The selling of farm supplies co-operatively is a much more difficult proposition than buying them. In the first place, there are greater risks to be

encountered, more chances of loss having to be assumed, and larger capital required. And then, again, our knowledge of marketing is very limited in comparison with our knowledge of production. All of our educational agencies, the press and clubs and all of the agencies for the help of farmers educationally have been encouraging production, and, practically, no systematic effort has been made towards instruction in efficient marketing. As a consequence of that, when farmers start in to market their own goods they are up against a proposition of which they are, to a large extent, entirely ignorant. And I believe personally that the farmer's business in all lines of farming, not only in vegetable growing but in all lines of farming, is production. Like Mr. Delworth, I believe that a farmer's business is certainly not retailing his goods. It is practically impossible to find men who are capable of carrying on expertly more than one line of business. The difficulty might, perhaps, be remedied to a certain extent by the farmer owning the organization through which his goods are marketed. At the present time, when the goods go through the farm gate, to a large extent they pass beyond the control of the farmers. However, there is a regular line which goods follow, and a system has been built up whereby the goods get from the producer to the consumer. Now, it is rather a difficult proposition for farmers to start in and change that whole system and the line through which the goods pass. Taking an illustration from the present war movement: Why is a flanking movement such a serious menace to an army? Simply because the whole detailed arrangement of transportation of the food and ammunition supplies has been set in motion towards a certain point, and to change that whole routing takes time, and serious difficulties arise if it is interfered with. Just exactly the same thing occurs when you endeavor to change the line through which your goods go to the market, and the question of doing it is a very much more difficult one for an organization of farmers than for a man whose business it is and who has become expert at it. However, as I said the farmer might retain his control over those goods a little nearer the consumer if he owned the organization through which they were marketed. At the present time he does not own the organization; but, in order to make it efficient, he must have a manager in whom he has confidence and who is a business man. Too many of our producing organizations have fallen down for the reason that they have appointed as manager of their organization one in whom they have had confidence as a successful producer, and it does not necessarily follow that because he is a successful producer he will be a successful seller, and in a majority of cases he has fallen down on the new proposition that he ran up against, and co-operation in that district fails and is blamed for the failure; whereas it is simply the method of going at it that has been at fault.

Another difficulty in the farmer marketing his own goods is that we lack legal standards on practically all of our farm products, and an intending purchaser wants to see them before he buys. Apples are standardized. We buy a barrel of No. 1 apples, and we are reasonably certain of getting a certain quality of apples, and can buy them without seeing them. If they are not up to standard we have redress. The Potato Growers' Association, on the other hand, must establish its own standard and must make its goods known. Apples and farm seeds are practically the only two products which are legally standardized as to quality, and, as regards all other products, the consumer wants to see the goods before he will pay his money for them, and pay extra price. That is another difficulty an Association is up against, to maintain quality and build up a business on that quality. These are some of the difficulties.

As regards local markets, a man who is in business in a large way certainly has not time to personally deliver all his goods in small packages over a city. At London they made a survey of their markets, and I believe that the farmer in that district came an average distance of about nine and a half miles to market; starting very early in the morning. I have forgotten exactly the average value of the load he brought, but it was very small indeed. One day I happened to be on the London market, and I saw farmers there with perhaps $2 or $3 worth of goods on their load. And they came perhaps seven, eight or nine miles, with two or three dollars worth of stuff, stood on the London market all the morning and sold it out in small lots of a few cents' worth to different customers and perhaps spent the afternoon delivering it. It appears to me a very uneconomical method of placing our goods before the consumer. As I have said before. the natural system



Cos Lettuce.

seems to be to specialize in different departments of the work. The control of these specialized industries should be largely under the control of the farmer, but the difficulty arises in finding competent managers to carry out the work for them.

Most selling associations in the Province are also buying supplies. We have a large number of such organizations in Ontario at the present time. Perhaps the largest number of co-operative producing associations are those connected with fruit, some fifty or fifty-two in number, which do a very large business. Live stock associations are being started. A system of marketing live stock is being worked out in a number of centres very successfully. The Minto Farmers' Club that I have mentioned previously, besides having a purchasing committee, has a live stock committee. This committee makes announcement of the day of shipment and the farmers who have cattle or live stock to ship on that day notify the manager of that committee and the live stock is brought to the shipping point.

Arrangements are made with the bank for the acceptance of checks, and the farmers are paid for their live stock when they are delivered at the car on the basis of quotations received from the market on the previous day; perhaps not exactly the amount that is coming to them, but somewhere near it, and adjustments are made later on. They are paid for their goods on delivery as they would be if delivered to a local drover. The manager of that live stock committee brings the stock through to market, takes charge of them on the road and at the market, and makes settlement of details with the members. That is a simple method of marketing live stock. It has been worked successfully on a larger scale, perhaps, across the line in various States. Our egg and poultry associations of the Province are doing a very large business, sixty or more of them being in existence. There are also a number of potato growers' associations starting into business. One of your delegates here this morning is from Sarnia, and you probably know of the excellent work of those two producing associations at that point. There are two of them working from the same centre, shipping vegetables by carload. A couple of years ago each of them did about $30,000 worth of business. Their business has increased very greatly since then; one of them having done a business of somewhere about $100,000 this year, and the other practically the same amount of business.

Another association is that of the Rainy River Potato Growers. At the little town of Emo are the headquarters of a producing association with six centres at six different points along the railway line which is shipping potatoes, hay and grain, poultry, eggs, live stock and various other farm products. A couple of years ago they did about $18,000 worth of business. They financed their operations by means of a joint and several note of the members for $2,000. Each member when he joins puts his name to the note for $2,000, and so makes himself responsible for the capital with which to do business and ensures that he remains with his company, because he makes himself financially responsible—one of the principles I believe that should be incorporated into the organization of any co-operative association. As I said previously, every member should be made responsible in some way financially for his Association so as to ensure his loyalty, because we cannot depend altogether on a member's loyalty when we have nothing else to depend on. The Rainy River Potato Growers' Association started out in a very small way. Their first purchase was a carload of seed potatoes of one variety so as to ensure uniformity in output. And as a result, this last year practically every farmer in that district, whether he was a member of the Association or not, was growing that one variety. You can readily see the advantage of this in marketing, where potatoes of one variety can be shipped by the carload. There was a field crop competition in that district and all the competitors, with one or two exceptions, were growing this one variety that had been introduced by the Association. To give you an idea of what can be accomplished in a small way by a number of farmers starting in on the right basis, they wished to purchase some apples this year, and as apples were cheap in Toronto, they wrote to one of the fruit associations in southern Ontario and bought two carloads of them, with the result that they saved on those two carloads of apples some $325 to their members. They are buying a third car on practically the same basis.

Where you have efficient organization, efficient management, and sufficient capital these things can be done very simply; but, where you have not these things, trouble is sure to result. I give you these few instances to show that even in a small way things can be done, and it is necessary to start in a small way so as to get all your members with the idea firmly fixed in their minds that they are not in the business from a personal profit standpoint in season and out of season, but that

they are in it to make a business success of that undertaking and people are doing it. I could give you instance after instance all over Ontario where the same thing is happening, and in spite of the many difficulties of successful co-operation it is gaining ground in this Province.

It is not necessary for me to talk to you on successful co-operation in the west or in the centres of Europe. It is taking place here undoubtedly, and I am sure that the vegetable growers, if they give their attention to it, could successfully accomplish the same also. What I want to make clear is that co-operation is not a scheme for getting something for nothing. It is a business proposition pure and simple. In carrying on any business there are certain fixed charges that must be paid, no matter what channel the goods go through, and, in organizing to do it yourself, provision must be made for the payment of these various overhead charges. Too many associations start in on a small scale, and some of the members or secretary manage those things for nothing, and start the organization on a wrong basis. When the business grows, and is being neglected because the manager is not being paid, and dissatisfaction results, then somebody is hired and paid to do the work. Then the charges are greater, the profits are less, and the dissatisfaction is greater with the co-operative movement. I believe in starting right—on a sound business basis so that these disappointments will not arise. I believe in starting in a small way and getting every member to understand the principle before he goes into this so that he will not be disappointed when difficulties arise. Every Association should start out with sufficient capital for the undertaking that it is going into, and every member should supply part of the capital. A good many of the Associations raise capital by selling shares, which is a good method. In a co-operative association the returns on the shares, however, amount to only a nominal interest, and the excess profits over a nominal interest go back to the members in proportion to the business they give the Association. Another system of raising capital, however, which has been worked successfully in a number of associations is by each member giving his note for a certain amount, and then these notes are used as collateral at the bank with which to raise capital whenever the association needs it. If the Association is successful the member's note is never cashed at the bank, and all that is used is not his cash but his credit. However, if the Association is unsuccessful the bank may have to recoup itself by cashing that note. That is the business risk you run in giving your note. The advantage of raising capital in that way is simply this: That you are paying interest only on capital while you are actually using it. For instance, when you sell shares you take the cash from the member for his share. Say you have $2,000 capital, necessarily you have to pay interest on the whole $2,000 whether you are using it or not. During certain seasons of the year you may be using only $200 or $300, but you have to pay interest on the whole $2,000, because you have taken the cash. Under the note system the notes just remain with the Association, and if you want two or three hundred dollars you just take two or three hundred dollars of notes to the bank, and you pay interest on that amount only. Then when your returns come in from the sale of goods or whatever business you are doing, take the money to the bank and redeem the notes. There are a number of associations using this note system of raising capital, and it seems to work fairly satisfactorily.

There are a good many schemes started with the name co-operation attached to them which, upon examination, are not co-operative in any sense of the word. But, because they are called co-operative, people are led astray, much money lost, and the whole movement brought into disrepute. Before you join any co-operative

association understand thoroughly the system under which it is organized. Satisfy yourself that it is co-operative; but, after you have once started, be loyal to your Association. Stay with your own business. Too many people have the idea that their co-operative association is something outside of themselves; they talk of selling to their Association or buying from their Association. They are not doing that; they are buying or selling through their Association. They are the Association, but they create an antagonism on the part of the members of the Association, not realizing that they are the Association themselves, which is different entirely from a commercial concern.

I want to warn you against being carried away with the crowd when anybody mentions co-operation. Too much of that thing has been done in the past. People

Pole and Bush Beans.

in the meetings get enthusiastic over co-operation, and say: "Let us co-operate and go to work at this thing and start it on a big scale." On examination, when the thing has been organized, we find it is not organized on a co-operative basis at all. I want you to understand what co-operation is, and be very careful in taking it up. However, in spite of all that, there are immense advantages to be gained by doing business together on a co-operative basis, not only in financial returns individually, but a volume of business is created, and increase of quality of your goods very largely results. That is illustrated in the egg proposition, and prevents injury. In hundreds of farms where members are co-operating to sell their eggs the output has been increased. They are taking better care of their poultry, and getting a better quality of eggs, and the consumption of eggs from that district is very much greater. And so great results will follow in working on lines of successful co-operation.

The branch of the Government with which I am connected, the Co-operative Market Branch, has been established with the idea of assisting in this organization of co-operative associations. We wish, if possbile, to advise and assist a body of men when they are starting in to form an organization, how to do so on a right basis. We want also to help in the accounting system of your organization, improving the business end of it by using a proper set of books and issuing returns to the members so that they may know what is taking place financially in their association; also a proper system of auditing. If necessary, if demand is made, we would like to have in the department experts on the various lines who can go to the associations and audit their books and size up the business from a marketing standpoint and find out, if possible, its weak and its strong points, and so assist that organization to strengthen itself where it is weak.

These are just some of the lines that we hope to follow in every way possible to assist in co-operative endeavor in the Province of Ontario. And I am sure that the people here are capable of accomplishing big things because you have a specialized industry. If you have fallen down to a certain extent in your endeavor, the fault has not been with co-operation; it has been perhaps your method of going at it, and a lack of system. You practically have had no organization whatever: starting, perhaps, on a too large scale you now see difficulties. They can be overcome and I trust that you are big enough to go at the business and make a success of it in spite of the things that you have learned and the difficulties you have encountered.

Prof. Crow: Do you know of any case where a farmers' organization has ever successfully run a retail store and sold their products?

F. C. Hart: Not of farm products alone.

J. Lockie Wilson: We have had a very excellent address from Mr. Hart, and I am sure great good will come of it. I understand that his branch will be willing to lend assistance to all the different farmers' and horticultural associations in the Province, to advise them as to procuring a better system of books and in other ways. This is an important proposition, and I know that there is a great work to be done in co-operation among the farmers and vegetable growers of this Province. And while Mr. Hart has an uphill job on his hands, I believe he will succeed in the end. With your assistance, and with his assistance to you, I know that this co-operative effort will be a success. And the very fact of your knowing that Mr. Hart is available, whose whole time is devoted to looking into the best methods of co-operation, showing the strong points and weaknesses of these different associations, is a very important thing for us.

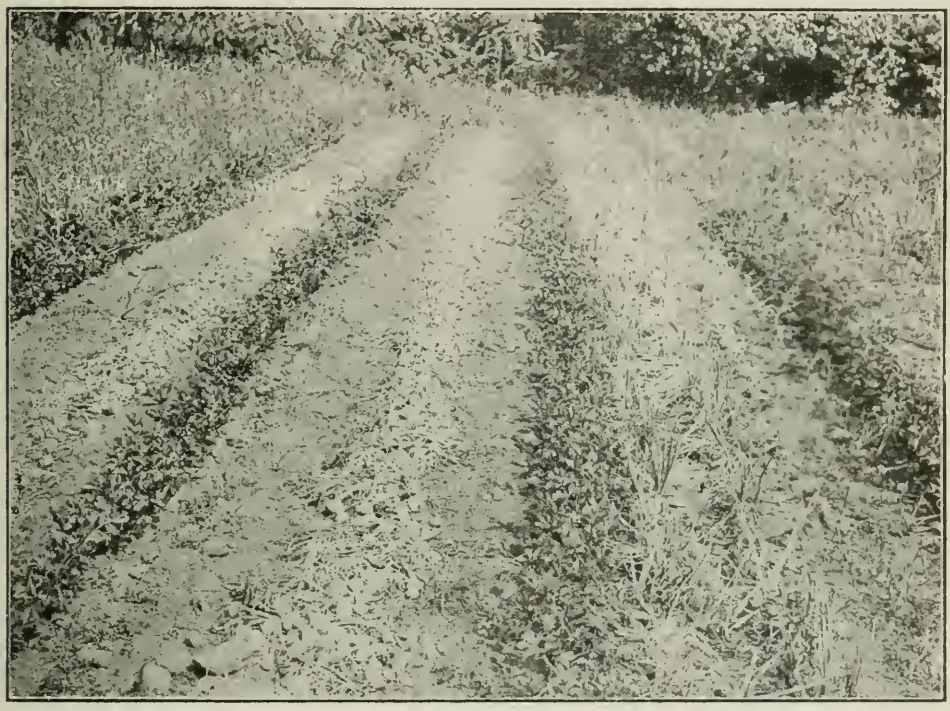
The best convention I ever attended was one at which every delegate had a small pad in his hands and was able to take notes. Some of you come very long distances, and have very good memories, but it will trouble the best of memories to keep track of all the good things occurring at this convention. The Association pays the delegates' expenses, and I would suggest that each one of you get a small pad and take notes of the most important things that you think will be of use to your branch of the Association.

There is no use in a delegate coming here and his expenses being paid if he simply goes back home and tells about the fine time and good speeches. You are here as the representatives of these branches and at their expense. You should take all the notes you can and carry this valuable information back to the other members of your branch.

## REPORT OF THE COMMITTEE ON CO-OPERATION.

F. F. Reeves, Humber Bay.

The Executive Committee has gone over the possibilities of co-operation as far as the buying of seeds is concerned, but owing to the war in Europe having thoroughly disorganized the market it is impossible to make any definite report. Where we will buy our seeds is a problem we can hardly solve. We are not by any means downhearted about the results of the past. For one thing, if we have not demonstrated anything this past year more than the fact that we can buy our seeds equally as well, at far less cost, with far better treatment than we ever got before, I think we have done good work. The reason of the little setback that



Celery and Onions.

we have had should not discourage us in any future effort. We intend to go ahead with the purpose of co-operation just as soon as things settle down and the market gets straightened out a little. At present we do not see that we can recommend any definite scheme to the branches.

I wish to move the following resolution:

"Your Committee named by the Directors to look into the buying of seeds have decided that, owing to the conditions prevailing in the principal seed growing countries of the world, no definite action can be taken until present conditions change, but we are of opinion that the branches should continue as in the past to encourage, as much as possible, co-operative buying and selling by the members of the Branches. The proposition is of such great importance to all our Branches that your committee would ask that they be given more time for investigation and

hope to be able to report a workable plan of co-operation for the members of our Branches at the Annual Meeting."

It is a pretty big proposition to formulate some definite scheme of co-operative buying. As the last speaker, Mr. Hart, ably remarked, while we may be good producers still when you come to the marketing and buying problem it is a different thing altogether. If you pass that motion, and let it stand over until either the war has ceased or some other place of production is found, it would be a good idea. The question of growing seed in Ontario is one that I think we could all take up. I have heard members of the Vegetable Growers' Association say that we could not grow seeds in Ontario. I do not think there is any seed that we use, even cauliflower, that cannot be grown in Ontario. The cost of production is a different thing.

W. J. KERR: There need not be any fear about the possibility of obtaining seed this year. I have a catalogue in which is quoted this year Extra Earliest Dwarf St. Paul Cauliflower, the ordinary seed such as you buy at $6 a pound, screened seed, $9 a pound. Cabbage, Danish Ballhead, the very best strain you could get 70 cents; Danish Roundhead, 60 cents.

Coming to root seed, here are this year's quotations on some lines. Take beets, for instance at 70s. a cwt., and 70s. figures out about 17½ cents a lb. Crimson Globe, 85s., and Detroit Dark Red 15s., and that is including duty. So that on many lines the prices will be no higher this year than last year. Some lines will be higher, but I do not think there will be any difficulty whatever in getting supplies. But next year we will not, perhaps, be able to get them. We hope that the large seed fields of Germany—I use that word "hope" advisedly—will be so ravaged that before the seed crop is harvested there will be no seeds produced in them.

THOS. DELWORTH: Where will we get the seeds?

W. J. KERR: From Denmark or Great Britain. As far as the French production is concerned that is different.

G. R. MCCALLA: It would be a great pity not to buy seeds when they are difficult to get. That is a time we need some help. We should continue to work more now than in normal times.

THOS. DELWORTH: I second Mr. Reeves' motion. While we may get price lists from Denmark we might have considerable trouble in getting shipments from that or any other European country. Firms might be quite willing to deal with us at those prices if they could get the seeds through. I would not consider those price lists of any value whatever. The insurance on shipments will be very high. It would be very much better for us to drop the thing for this year, develop as far as possible our own growing of seeds and then let us start the thing under normal conditions.

J. LOCKIE WILSON: There is nothing in that motion that will prevent the branches from doing all they can in purchasing in a co-operative way. I think that Mr. Reeves' proposition is a reasonable one. While Mr. Kerr may be absolutely correct—I am sure he will be with regard to the price in Denmark—who knows whether the growers in Denmark will have any seed to ship? Who knows whether Denmark will be allowed to ship any seed to us during this coming winter? This is almost becoming a world's war and we do not know when the end will be. The Prime Minister of England cannot tell you. A prominent French officer in yesterday's paper made a statement that this war would not be closed until 1917, and that the German army would not be driven across the Rhine until

1916. They may be wrong; I hope they are with all my heart, but under present conditions I would say to you: Let us consider this matter carefully. Our Annual Meeting will be held in January, and, if things change then, we can go right ahead and assist you in every possible way.

COLIN MCNICHOL: I approve of the resolution that is before us. We would all like good seeds shipped to us, but they must be good. No matter how cheap we get them they are no use unless they are of high quality. I am willing to pay a little more for extra good seed. It is worth dollars to me.

W. J. KERR: I do not want to oppose this motion of Mr. Reeves. I feel like supporting it very strongly, but I think there will be no difficulty in getting all the seed we want for this year.

J. LOCKIE WILSON: I telegraphed Prof. Macoun asking him if he could be here to-day to give us a short address on the growing of seed; that is, how to grow one's own vegetable seed. He was unable to be present, but has sent a short paper which I will read if you wish.

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## HOW TO GROW ONE'S OWN VEGETABLE SEEDS.

W. T. MACOUN, DOMINION HORTICULTURIST, OTTAWA.

As conditions in some of the countries which supply Canada with vegetable seeds are not likely to be favorable for the production of seed next year, and as there was, no doubt, less seed produced this year in those parts of Europe which the war has affected, it would seem desirable that Canadians should make an effort this year to save some home-grown seed, and to plan to grow some next year. Not only would it ensure having a supply, but it would be found a very interesting occupation, and the results which have been obtained in the past from using home-grown seed have been very good in many cases.

It is a simple matter to save seed of vegetables which have only an annual growth, such as beans, corn, peas, peppers, tomatoes, cucumbers, melons, squash, pumpkins, radish, lettuce, etc. All that is necessary is to clean the seed as soon as possible after the vegetables are ripe, dry it rapidly and then keep it dry until it is needed for sowing. Raising seed of biennials such as beets, carrots, parsnips, onions, cabbage, cauliflowers and celery is a little more difficult, but it is these which are imported mainly from other countries, and it is hoped that a large number of persons will try raising seed of them.

To grow seed of beets, carrots, and parsnips, good medium-sized shapely specimens are selected at digging time, the tops are cut off to within about two inches of the end of the specimen, thus leaving the centre shoot. Cutting back close to the root will remove this centre shoot, which is not desirable. Store the roots in a cool, fairly dry cellar, or they may be pitted outside; but if this is done care should be taken not to cover them with much soil until really cool weather sets in, so as to avoid danger of heating. Early in the spring plant the roots out in good, well-drained soil, planting them about two feet apart in rows three feet apart. When planting, it is desirable to have the top of the beets, carrots or parsnips slightly below the surface of the ground. Cultivate the ground regularly, and the reward is likely to be a fine crop of seed. The stalks are cut when the seed is beginning to ripen and allowed to dry thoroughly, after which the seed may be

threshed out and put away in a dry place until it is needed in the spring. To grow cabbage seed, plants having the best heads should be selected, and the whole plant dug. Half-formed heads or even the stumps after the head has been removed will produce seed, but it is recommended to use plants with good heads.

During the winter the plants should be kept in as cool a place as possible without freezing, and if freezing cannot be prevented they should be kept where they will thaw out gradually. The best plan is to store them outside. A trench is opened where water will not lie, wide enough for three or four cabbages side by side. They are set in this in a slightly sloping position with the roots down. The tops are then covered with straw at first or a light covering of earth to keep out light frosts, and later covered with sufficient soil to prevent freezing. It is important not to put the soil on until it is necessary to prevent frost, as there is danger of

Forced Rhubarb.

the cabbage heating. Cabbage can be successfully stored in any cool cellar, if it is not very dry or very wet. In the spring the cabbages are taken out and planted, when severe frosts are over, about three feet apart each way, putting all the root and stalk below ground and leaving the head above. When solid heads are used slits should be made cross-wise on the top of the head when planting, which will make it easier for the seed stalk to force its way out. Seed stalks will soon be thrown up and each plant will produce a large quantity of seed. Banking the earth against the stalks will help support them. When part of the seed pods have become brown the stalks should be cut and hung up and threshed when dry, and the seed kept dry until needed. Cauliflowers are treated much the same as cabbage, but are much more difficult to bring through the winter. Where the season is long, plants from early spring seeding might ripen seed the same season.

In growing onion seed the first step is to select medium-sized well-shaped and well-ripened bulbs and then store them in a cool, dry place. Early in the spring

they should be planted out about six inches apart in rows three feet apart. If the onions have sprouted the sprout should be cut off when being planted, as they will then throw up straighter stalks. The upper side of the bulbs should be an inch or two below the surface of the ground after being planted. This will protect them from spring frosts. The ground is then kept cultivated. When the plants have grown sufficiently they should be banked up about six inches, to help support the plants when the tops become heavy with flowers and seed. When the seed stalks show yellow near the ground the seed balls are cut off with about two inches of the stalk attached, it being necessary to go over the plantation several times, as they do not all ripen at once. They are then spread out to dry, and when dried are threshed and the seed is cleaned and put in a dry place until needed. It is important to dry the seed as rapidly as possible.

It is rather difficult to grow celery seed in this country. Where celery seed is grown in quantity the plants are left outside and protected from frost, if it should be sufficiently severe. In most places in Canada it will be necessary to store the plants, unless they can be protected sufficiently in the rows they are growing in to keep out frost. This may be done with care, but there is danger of the plants heating in the spring unless some provision is made for ventilation. This can be effected by nailing two boards together in the shape of a trough and then inverting this and putting it over the plants after they have been well moulded up, supporting and raising it enough for air to readily pass through. When there is danger of the plants being injured by frost they should be banked up well, the inverted troughs put in place and then some straw put over. As soon as severe frosts come and there is no danger of the plants heating, more soil should be put on and the plants protected sufficiently to keep out frost. Towards the close of winter the ends should be opened to let the air pass through. Celery may be stored for seed purposes in the cellar, but it is very difficult, unless conditions are very good, to prevent it from rotting before the plants can be set outside in the spring. When severe frosts are over in the spring the plants are set out about a foot apart in rows three feet apart and the land kept cultivated. It will not be long before seed stalks are thrown up. The seed is gathered when about ripe, dried and cleaned and put away until needed.

The methods which have been suggested for obtaining home-grown seed may not in all cases be such as are adopted by large commercial seed growers, the object now is rather to tell how the average householder can grow his own seed.

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## VEGETABLE WORK AT THE VINELAND EXPERIMENT STATION.

F. M. Clement, Jordan Harbor.

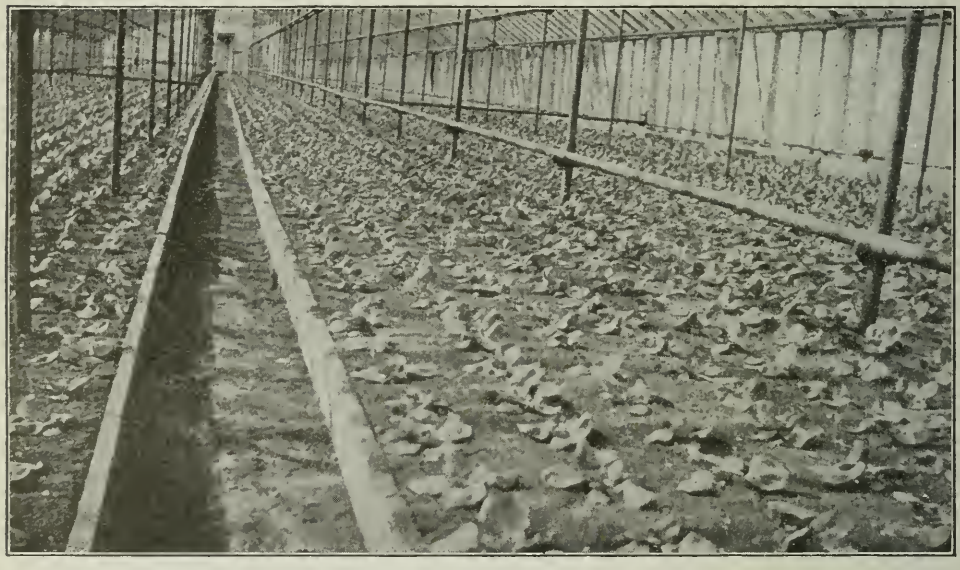
Owing to various changes in the management, the work at Vineland has not progressed as well as we would have liked, but we have no apologies to offer. The late Mr. Lund left an outline of his work as it was started almost three years ago. We had to begin again at the bottom, because his selections were lost last fall and winter. Such loss may not be expected in the future, as we have installed steel cases, handy, dry and rat-proof, in which to store our seeds.

This year we made selections from seven varieties of garden and factory peas: Alaska, Gradus, Thomas Laxton, Horsford's Market, McLean's Little Gem, Tele-

phone and Champion of England. Two objects we have in view: plant improvement through seed selection, and a study of the methods, ways and means of improvement that may assist us when undertaking other work.

In asparagus we have seedlings of six varieties from which we are making selections of plants that are wholly or partially resistant to rust: Palmetto, Giant Argenteuil, Barr's Mammoth, Columbian White, Connover's Colossal, and Eclipse. We have here the same objects in view as with the peas, improvement by plant and seed selection.

In onions we grew four varieties: Giant Prizetaker, Yellow Globe, Danver's Ailsa Craig and Red Weathersfield. Bulbs of each variety have been carefully selected, and it is hoped that from these we may get some seed this coming summer, or at least some information and practical experience that will be of assistance to us in the future.



Boston Head Lettuce.

Tomatoes were given most attention. In all twenty-three varieties were grown, and seed selections have been made from each. Here again, the object is plant improvement by seed selection.

Perhaps the most interesting part of the farm from the vegetable grower's point of view is the three acres of Skinner Irrigation, installed in 1913, at a total cost of approximately $250 per acre for materials, exclusive of the pumping plant and mains. The $250 does not include labor. The trenches for the underground pipes can be ploughed out to a depth of 18 or 24 inches. By purchasing the necessary tools, including drills, stock and dies, vise and pipe cutters, the work of fitting and attaching the pipes can be done by a handy man. Our work was done at various times, partly in the winter and early spring, and on wet days after spring opened. The excavating was done at such times as the men and teams could be spared from regular work. I do not, however, advise this in every case. Pipes delivered in the summer can be erected in the fall and tested, so as to be ready for the following spring.

The following is a detailed statement of the cost as estimated from our invoices and from the materials used to install one acre:

| | | |
|---|---|---|
| 368 feet 2" pipe galvanized underground at $12.06 per C | $44 38 | |
| 72 feet 1¼" uprights at $9.45 per C | 6 80 | |
| 576 feet 1" uprights at $5.78 per C | 33 29 | |
| 1,152 feet 1" lengths at $5.78 per C | 66 58 | |
| | | $151 05 |
| 288 nozzles at 5c. each, 30 per cent. duty | $18 72 | |
| 9 patent sieve unions at $2.40 each, 30 per cent. duty | 28 08 | |
| 72 hangers at 18c. each, 30 per cent. duty | 16 84 | |
| 1 gate valve 2" at $3.80 each | 3 80 | |
| 9 small valves for end upright at $2.60 each | 23 40 | |
| 9 elbows and 9 "T" (20 lbs.), at 19c. per lb | 3 80 | |
| 9 bags cement at 40c. each | 3 60 | |
| | | $98 24 |
| | | $249 29 |

The above figures, $249.29, or approximately $250, for the materials are exclusive of freight. The labor for erecting, if paid in cash, would cost approximately $35, exclusive of team work. If a large share of the work is done by the regular help at monthly wages, the cost would be somewhat less. We used water direct from the mains of the farm water system. This is pumped by an 8 h.p. gas engine, purchased from Goold, Shapley & Muir Co., Brantford, at a cost of $360, and Myer's Bulldozer Pump No. 362. This has a capacity of seventy-five barrels an hour. At this rate of pumping the nozzles on one and a half acres are running full under the pressure of thirty pounds. This pressure on a still day will throw water from twenty-eight to thirty feet. Six gallons of gasoline will run the pump ten hours. The value of irrigation on vegetable crops has been demonstrated many times, especially on such crops as lettuce and celery. Thus far we have had no opportunity to arrive at definite results in figures, but such figures as I have I am prepared to give.

The twenty-three varieties of tomatoes were grown under irrigation with check plots adjoining. As the figures indicate, there was with the crop this year a direct loss in most varieties and a decided loss in the total average. The following figures are in bushels per acre:

| Variety. | Wet. | Dry. |
|---|---|---|
| Earliest of All | 385.6 | 231.3 |
| Royal Red | 560.1 | 721.3 |
| Success | 390.1 | 512.6 |
| Earliana | 462.7 | 403.7 |
| Atlantic Prize | 344.7 | 430.9 |
| Imperial | 449.1 | 589.7 |
| Livingston's Favorite | 512.6 | 698.6 |
| Bruce's First and Best | 430.9 | 594.3 |
| Livingston's Stone | 544.4 | 730.4 |
| Chalk's Early Jewel | 567.0 | 512.6 |
| Ponderosa | 621.5 | 757.6 |
| June Pink | 485.4 | 558 |
| Dwarf Champion | 362.9 | 440 |
| Ignotum | 476.3 | 558 |
| Plentiful | 544.4 | 585.2 |
| Bonny Best | 576.1 | 535.3 |
| Beauty | 675.9 | 576.1 |
| Dominion Day | 263.1 | 244.9 |
| Magnus | 517.1 | 449 |
| Dwarf Aristocrat | 308.4 | 362.9 |
| Alacrity 23.11 | 480.8 | 417.3 |
| Alacrity 23.14 | 440.0 | 499.0 |
| Early Ruby | 458.3 | 326.6 |
| Total | 10,857.4 | 11,735.3 |
| Average | 472.1 | 510.2 |

It is interesting to note that though the total average shows a loss from irrigation, the earliest varieties, with some exceptions, were benefited by irrigation, Earliest of All, Earliana, Chalk's Early Jewel, Dominion Day, Alacrity 23.11, and Early Ruby. All the late fruiting varieties seem to have been injured by too much water. The total rainfall between June 1st and September 1st, the best part of the growing season, was 10.75 inches. Only once was there really need for irrigation, and this was between June 16th and 18th. The early tomatoes seem to have been benefited by water applied at this time. Another application was made about two weeks later and another on July 16th. The night and day following this last application we had a rainfall of .95 inches. In my opinion, this was when the damage was done, as the soil was extremely wet for some time after, and the tomatoes that had not been irrigated were the first to recover. From our results this year, and from observations in the near vicinity for factory purposes, I would recommend any one of the following: Bonny Best, Success, Ignotum, Chalk's Jewel, Livingston's Stone or Livingston's Favorite, and for early market, Earliana, and Bruce's First and Best. Any one of the good factory varieties makes a good late market variety.

The strawberries and raspberries under the irrigation have not been studied sufficiently long to merit a report.

In conclusion, I wish to express my appreciation of having had an opportunity to meet the Vegetable Growers. We are anxious to co-operate with you and shall be only too pleased to take up the study of such problems as in the opinion of your committee are of most importance.

A Delegate: Can any one purchase the materials at those figures?

F. M. Clement: Those we copied from our invoice from the Skinner Irrigation Company. Since we purchased our materials they are being made here in Toronto, with the exception of nozzles and hangers and unions; the balance can be purchased here in Toronto.

Thos. Delworth: I understand you purchased two-inch galvanized pipe in the United States, and it was laid down here for 12 cents a foot?

F. M. Clement: No, that is exclusive of freight and duty.

Thos. Delworth: I have installed the Skinner system this summer, and my pipe is made at Guelph. I have not my invoices here. and I am speaking from memory, but I think it is about the same price; 2½ inch cost me $21.45.

F. M. Clement: We did not use 2½ inch at all. Our 2 inch cost us $12, plus freight and duty.

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## VEGETABLE WORK AT THE ONTARIO AGRICULTURAL COLLEGE.

J. B. Britton, B.S.A., O.A.C., Guelph.

The vegetable gardening work at the O.A.C. constitutes a branch of the Department of Horticulture. The work is partly carried on in conjunction with fruit growing, especially the small fruits, which seem to fit in well with gardening. The conditions and facilities at the College necessarily differ from those of an experiment station, but most of the propagating work is done on an experimental basis. Data is gathered as to yield, quality, methods, etc., which may be of benefit to the students, ourselves and the Ontario growers. New varieties are tested, new methods and systems tried out, experiments conducted and plant breeding work carried on. Lectures in Vegetable Gardening are given to the students of the First,

Second, Third and Fourth Years of the regular course, and also to students of Macdonald Institute, making in all about one hundred and ten lectures in the college year. During the summer months about forty lectures on vegetables are given to the school teachers taking the summer course. It is believed that more knowledge of vegetable gardening will be of great benefit to teachers conducting school gardens or teaching agriculture in their schools. The vegetable crops will usually appeal more to the boys and girls than any other line of agriculture, and in this way the work may be far reaching.

Within the past few years vegetable gardening has been attracting much more attention than formerly. There is a growing demand for vegetable products of good quality at all seasons of the year, and the commercial production of these crops offers greater returns than ever before. The production of vegetables under glass

A Heavy Crop of Tomatoes.

has become an important and profitable adjunct to market gardening, and the need for more instruction in this work has been felt at the College. At the present time we have not adequate equipment or proper greenhouse space for carrying on this work as we should like to. The need for new buildings and greenhouses is becoming more acute each year. The present year class in Horticulture is the largest in the history of the Ontario Agricultural College, and already students of the Third Year class have asked for lectures in Vegetable Gardening, which is a precedent, as this class never had lectures on this subject before. The importance of this branch of agriculture is being realized.

We receive many letters during a year requesting information regarding the culture or treatment of such crops as mushrooms, asparagus, rhubarb, onions, celery, etc., or the storage of vegetables, the treatment of soils, the cost of irrigation, etc., etc. These enquiries come from market gardeners, farmers and amateur gardeners, and we are always pleased to send information to the best of our knowledge. We should like to receive more letters from the vegetable growers. It would help us to know in what way we can best serve their interests.

We aim to provide the two dining halls at the College with a continuous supply of fresh vegetables from the garden. This provides a ready outlet for the crops grown and one from which we can often obtain useful information.

Two years ago breeding work was commenced with tomatoes. The varieties used were Grand Rapids, Clipper, Industry, Bonny Best and Hipper No. 2. Six crosses were made, including two reciprocal crosses, and the first generation grown in the greenhouse. This year over 1,750 plants of the second generation were grown in the field and selections made of 420 plants which showed desirable variation. Further selection another year should isolate the plants which breed true for the desired characters.

A variety test with tomatoes during the past season has given us results as indicated by the tables. The climatic and soil conditions at Guelph are not favorable for the growing of early tomatoes, but we have calculated the yield of earliest fruit to ascertain which varieties give the greatest amount of early tomatoes. These do not always give the greatest yield for the season. Ten plants of each variety were grown and the average per plant is given. The first three pickings were made August 4th, 6th and 12th.

TABLE No. 1.—VARIETY TEST OF TOMATOES, 1914.

(Showing the yields per plant for picking season, from August 4th to September 25th.)

| Variety. | Pounds. | Ounces. |
|---|---|---|
| Alacrity | 8 | 6½ |
| Langdon | 7 | 13 |
| Earliana, O.A.C. | 7 | 13 |
| Extra Early Pink | 7 | 12 |
| Earliana | 7 | 1½ |
| London | 6 | 15 |
| Prosperity | 6 | 14 |
| June Pink 1 | 6 | 13 |
| O.A.C. Special | 6 | 10 |
| June Pink 2 | 6 | 8½ |
| Gourmet | 6 | 7 |
| R.J. 1441 | 6 | 6 |
| 90 Day | 6 | 5 |
| Amager Market | 6 | 4 |
| Red Canner | 6 | 4 |
| Noll's Discovery | 6 | 3½ |
| Prematurity | 6 | 3 |
| 1940 E. F. Alacrity | 6 | 1 |
| Earliest of All | 5 | 14 |
| E—2-6 C.E.F | 5 | 11½ |
| Wealthy | 5 | 10 |
| Extra Early Red | 5 | 7 |
| R.R. Hood | 5 | 3½ |
| Daenfelt | 5 | 3½ |
| Danish Export | 5 | 3½ |
| Bonny Best | 5 | 1 |
| Gourmet O.A.C | 4 | 15½ |
| Red 14 | 4 | 12 |
| John Baer | 4 | 7 |
| Sutton's Best of All | 4 | 6½ |
| Fillbasket | 4 | 3½ |
| Vaughan's New Globe | 4 | 1 |
| Partici | 3 | 4½ |
| California | 2 | 14½ |
| Chalk's Jewel | 2 | 8½ |
| Brimmer | 2 | 8 |
| Extra Early Mascot | 1 | 14 |
| Napoleon | 1 | 15 |

TABLE NO. 2.—TOMATOES, 1914.

(Showing yield per plant from different varieties for the earliest three pickings.)

| Variety. | Ounces. |
|---|---|
| Earliana, 2-6, O.A.C., C.E.F. | 18.5 |
| Fillbasket | 18.1 |
| Earliest of All | 16.5 |
| John Baer | 16.0 |
| Vaughan's New Globe | 15.3 |
| Extra Early Pink | 14.4 |
| Red Canner | 14. |
| Prosperity | 13.3 |
| Noll's Discovery | 12.0 |
| Sutton's Best of All | 11.5 |
| Extra Early Red | 11.3 |
| June Pink | 11.0 |
| Red 14 | 11.0 |
| Alacrity | 10.6 |
| 90 Day | 10.5 |
| London | 10. |
| Gourmet | 9.1 |
| Amager Market | 9.0 |
| June Pink | 8.8 |
| Danish Export | 8. |
| 1940 E. F. Alacrity | 7.8 |
| Ontario Seed Co. | 7. |
| R. J. 1441 | 6.9 |
| R. Riding Hood | 6.5 |
| Earliana | 6.5 |
| Wealthy | 6.3 |
| Chalk's Jewel | 5.9 |
| Daenfelt | 5.5 |
| Brimmer | 4.9 |
| O.A.C. Special | 4.5 |
| Gourmet, O.A.C. | 4.5 |
| Earliana, O.A.C. | 4.0 |
| California | 4.0 |
| Prematurity | 3.7 |
| Partici | 3.0 |
| Extra Early Mascot | 2.3 |
| Langdon | 2.75 |
| Napoleon | 2.0 |
| Bonny Best | 2.5 |

## TOMATOES UNDER GLASS.

This fall we are testing out three varieties of tomatoes under glass which appeared very promising in last spring's crop., viz., Industry, Kondine Red and Ailsa Craig. We received requests for seed of these varieties and sent out small packages to several growers. The Industry is fairly well known as a good indoor tomato. Kondine Red has a more open habit of growth and sets fruit freely. The fruit is round and smaller than Industry. Ailsa Craig sets many fruits to a truss, and has an open, spreading habit of growth. The fruit is, if anything, slightly smaller than Kondine Red. We will gladly furnish seeds of these varieties to anyone who wishes to try them.

Several years ago an effort was made to obtain, if possible, an indoor cucumber of the American type with the fruiting habits of the English varieties, which will set freely without being pollinated. To this end breeding work was commenced, using Sutton's Everyday, Fisk White Spine and Princess. By selection we have secured several very promising strains and hope to have the type well set by another year. The desired type has the qualities of being dark green in

color with very little striping, free from spines, smooth, and well filled out at stem end. The neck of the English type is not desired.

The Denia Onion has been grown very successfully by transplanting. This variety gave onions which average about one pound. They are slightly coarse in texture, very mild, and give evidence of fair keeping quality.

The growing of vegetable seed in Ontario has been under discussion more or less for several years, but at this time there seems to be stronger reason than ever for the production of home grown vegetable seeds. Work along this line has been undertaken at the O.A.C., and we expect to have a crop of vegetable seeds next year. Almost any grower could produce seeds of certain vegetables, but the work is a specialty and requires careful selection and storage.

To those who grow strawberries, it may be interesting to know that this crop is receiving a great deal of attention at the College. The best varieties for

Loading cars for Valcartier Camp.

certain qualities have been chosen for breeding purposes, and we now have several thousand seedling plants which should give some interesting and valuable material when they come into bearing.

Asparagus and rhubarb are two other crops which are being studied and under research work.

Vegetables are not well understood by the average consumer, and the quantity used is far less than should be. An understanding of their food value and the many different ways they may be prepared to make appetising and nutritious dishes would help materially in reducing living expenses. The vegetable grower is doing a great service to his country. A country must depend upon its food supply, and to this the vegetable grower is contributing. He supplies the food which is cooling to the blood and conducive to better health. At times, when fruit is considered a luxury, vegetables are looked upon as a necessity and a staple article of food, and the prices of vegetables have not advanced in comparison with some other lines of produce.

## BREEDING OF VEGETABLES.

A. J. Logsdail, Ottawa.

In June I was on the other side at an American agricultural institution, and I saw that they had a summer course of six weeks solely for instruction in the breeding of vegetables, so you will understand that I can only give you a very general outline on this work in the time allotted to me.

In Ottawa we have conditions that you have not got here. Our season is shorter; we are troubled with frosts generally in the early part of June, and after the 1st of September we can look for frost at any time, so that we are unable to grow a good many of the varieties that I grew several years ago in this section in the Niagara district. We have to look solely to the production of early maturing varieties, and our work at present is trying to produce several of those early maturing varieties of corn, tomatoes and peas, and after we have established them to send this seed out to the enormous areas of our whole country, and try to find out if we are able to assist them in the growing of those crops. At Ottawa we handle four chief crops in vegetables at present. We have peas, French beans, sweet corn, and tomatoes. Peas and beans we are able, of course, to mature every season successfully, and our work with peas and beans has been done very carefully during the last two or three years. We are using only certain varieties that we have been able to mature, such as Gregory, Surprise, Gradus, American Wonder, English Wonder, and McLean's Advancer. And we have introduced also into our new work some of the bigger varieties, such as Champion of England and Duke of Albany.

We must have early varieties, and the question is to get an early variety that will mature the majority of its crop as quickly as possible. I will give you an instance of our work in tomatoes. We had several selections of the Earliana, our own Alacrity, and several other early varieties. We found on the average that in the first two weeks of picking we matured between three to six per cent. of the total crop before frost. We occasionally have early frosts that practically spoil the whole of our crops, so that our object is to try to produce an early variety that will mature at least 20 per cent. of its standard crop in the first two weeks of picking. That is a high standard to set, as you will acknowledge, if you have ever tried to find out how much the tomato will yield in the first two weeks after you start picking. The Earliana yielded a little over 3 per cent. of its total crop. We have now got some strains of Alacrity that have matured as high as 12 to 12½ per cent. of their total crop in the first two weeks. In the first month of picking we have secured as high as 24 per cent. of the total crop. But I would not like to advise anyone to grow Alacrity in this section. It cannot yield in comparison against varieties that you generally grow down here, such as Success and Chalk's Jewel. It is not a great yielder, but the main object of its growth has been for sections in our central provinces and in the northern sections of Ontario, where our seasons are short, and we are afflicted with early frosts at any time after the 1st of September.

The same problem confronts us in growing sweet corn. We grew, or tried to grow, some of the best of your early varieties generally grown here, but we found that only occasionally did we succeed in securing anything like a crop. The only variety of sweet corn that we have been able to mature every year at Ottawa has been a variety known as Early Malcolm. It is of Russian origin; only a small sweet corn, but we have been able to mature it every year. In this

corn we have found the characteristic that we call hardiness. Hardiness in the corn sounds somewhat peculiar, but in certain varieties of corn we have certain species, amongst them Indian Squaw, a little short dwarf corn, that we found will grow under almost any conditions. Cold evenings do not seem to check its growth at all. And despite the fact that Early Malcolm will mature at Ottawa, we found it would not mature in many sections where Squaw will. It had not the hardiness. So our object has been to secure, if possible, a new sweet corn of hardiness. We have also used Early Adams, a sturdy dent corn, opaque in color. We used Early Adams, because we had a particularly good strain of Adams corn. It is so early that we are able to mature it at Ottawa, so that we used it as one parent. We crossed Early Adams and Early Malcolm, and here are samples of the two parents pure. This is Early Adams; this Malcolm. We crossed them and secured two

Tobacco under Cheesecloth.

forms of ear. Any of you who have had any interest in Mendel's laws and laws of progeny will find something rather peculiar here. I asked Prof. Crow for an explanation, and he could not give it. He started me on this. We have got here two ears. In one of them you see some grains of sweet corn, all wrinkled like the pure Malcolm, and others pure and opaque like the pure Adams. In one of them we got flint and some opaque. Both of these ears, I must impress upon you, are Early Adams pollinated with Early Malcolm. It is not a cross of them. Both of those grown on the Early Adams were crossed and pollinated with Early Malcolm sweet. We took this ear and sorted out the seeds, apparently the sweet seeds and apparently the flint seeds, and we grew them separately. Our first generation was secured this summer. We sowed both of those kinds of seeds separately, and of the wrinkled sugar seeds of that year we got a new sweet corn, that is, as you see, a considerable improvement on the old parent. I do not say that it

will hold up to that; I cannot say. We have here a few sweet corn cobs; I do not know whether they will hold up to the standard or not. They were produced only this summer; but they matured at Ottawa, and that is something that we have been hunting for. It is the biggest sweet eared corn that we can grow up there and mature. It matured within about four days of Early Malcolm and about two weeks earlier than Golden Bantam with us. We have here a possibility. As to quality, it is too soon to speak of that. A few years will show. There are a good many people growing a flint corn that is no better than that. We have been sending out heaps of grain for people to experiment throughout the country. They have been growing even flint corn as eating corn. Sweet corn in many sections is unknown as a growing crop. Through Northern sections of Quebec they have Early Canada. It is of old origin and a flint. And through Manitoba where they have Squaw or Manitoba. it also is flint. They have been growing it very largely for eating purposes. We have here a new sweet corn. but we do not know its value. The sweet kernels on that ear produced this, and the dented kernels on that ear produced other ears of excellent shape, but only half and half. Now, on the other side, we have an ear here of peculiar characteristics; it is neither one thing or the other, and it produces a series of peculiar ears, some of them eight and some up to fourteen rowed corn.

One comes across in breeding many problems that are most perplexing. The breeding of vegetables is often imagined by the general public to be an abstruse and mysterious science. It is only within the last few years that scientific men—their names are legion—have devoted all their energies to this science and have evolved numerous theories and hypotheses that to the ordinary student are bewildering. I advise any person that takes up the hobby of breeding on their own, to do so and steer clear of the ultra-scientific side of it, but he sure of what you are doing, and record everything you are doing on paper. Then when you begin to get results you can then begin reading up the scientific side and try to apply it. Many of our growers have been frightened in their breeding work by the stupendous volume of abstruse science which you strike whenever you find a modern book on this subject. The breeding of vegetables is exceedingly old, as is evidenced by our present understanding of certain vegetables. You can go into the streets to-day and ask anyone for their opinion of a carrot. a parsnip, or a cabbage, and they could give you a fairly good idea of their opinion of that vegetable, its shape and form and appearance. But if in the days of the Roman Empire you had asked a citizen of that empire his opinion of a carrot, a cabbage, or a parsnip, it would be entirely different. It has gradually evolved to our present knowledge. There has been a great deal going on in plant improvement. It has been done mainly through selection. Men have grown crops, and they have saved the best of them for future seed purposes. In this work of growing vegetables we are peculiarly fortunate, because almost all our crops are grown from seed. We have each year new material to work with. The fruit men have to look generations ahead for results of crosses that they are now doing. Perhaps their children and children's children will have the joy of reaping the benefit of the crossing they are doing in fruits. We hope it will come sooner, but we cannot say. In this line any man can do a certain amount of selection work. Zones that are experiencing similar climatic conditions must ultimately verify their own sources of seed production.

In my work with peas I have found out that our home grown pea seed at Ottawa is so superior to pea seed bought from the most reliable of seed firms

that I have discarded buying seed. If I buy a variety of seed for hybridizing work at Ottawa, I always grow them a season to acclimatize them under our conditions. In some varieties we gain as an average two pods per plant on close sowing and three and a half pods per plant on open sowing from our own seed and seed immediately introduced with that strain.

There is another point in the breeding of vegetables that I would like to point out. There are two general classes of plants in vegetables. Some that are self-fertile, like the pea and bean, and some that are cross-fertile, or generally cross-fertile for their best quality. Corn, if inbred too closely, will go down. It is essentially a cross-fertile plant, and nature has given it means for cross-fertility and nature has given the pea and the bean means for self-fertility. And many men could materially improve their own strains of the self-fertile crops by straight selection without injury. We have been doing some of this selection work on two varieties, particularly, English Wonder and Gradus peas, for some years past. In this work I need hardly say that everything needs to be done very accurately, and you cannot sow seed as you can on a commercial scale. After we have produced the variety we hand it over to the experimentalist and ask him for his opinion of it under commercial growing. We find out certain varieties will yield heavily, but we do not know if they have an inherent quality of heavy yield. As an instance of this work to try to find different varieties of peas that have heavy yielding qualities, I will give you an outline of one of our experiments. We took the varieties, Gregory, Surprise, American Wonder and English Wonder. We picked out the 100 best seeds of each variety we could find, and planted them at an inch and a half apart. We again planted in another row 100 of the best seeds we could find eight inches apart. We always do all our scientific work on dry seed, because after seed is dry it cannot be drier. American Wonder at an inch and a half gave us a pound to a pound and a quarter per 100 seeds. English Wonder at an inch and a half gave us a pound and an eighth to a pound and a half per 100 seeds. But at eight inches in the row Gradus gave us two pounds per 100 seeds, but the English Wonder climbed up to five and a quarter pounds. We found out by that work that by growing Gradus at an inch and a half or eight inches apart per seed we had only approximately added 75 per cent. to the yield, but on English Wonder it added over 200 per cent., thereby indicating that English Wonder had inherent power of heavy yield. We then sorted out our varieties into those which have an inherent power of heavy yield. I just outline this to you as an instance of work that can be carried on by almost every grower in his own section, and he could, therefore, in my opinion, secure seed equal at least to, if not better than, seed he can buy anywhere.

We are doing a good deal of work in selecting tomato and corn, such as we have here, and we are sending out every spring samples of the seed to experimenters to try. We sent out last year through our department about 1,700 samples of this seed into the several provinces to different experimenters, who have most kindly undertaken to grow seed for us and report to us. I sent to the Province of Ontario, in the more southerly sections, about 100 samples, and from the reports of the tomato work—we have not got more than forty of our Ontario reports in yet—the variety Alacrity has been spoken of highly as regards earliness. There may have been several of you around Toronto trying that seed. It was sent out for no other purpose than to demonstrate its earliness. I do not profess to say it will stand beside the varieties you generally grow in more southerly sections. Any man who is experimenting with our seed is doing more to help us than to

help himself, and we are much obliged for the information you are able to give us along that line, but I do not think that our seed along tomato lines is any good to you. But regarding this Alacrity that we are sending out throughout the provinces, we have yet to receive word from any grower who has had a variety as early. It indicates that seed produced in a certain zone is applicable to other districts that have a similar climate, and I think myself that we have before us a great field of work for both the Jordan Harbor Experimental Station and our Dominion Farms in producing our own seeds.

Cabbage.

We have this fall grown a lot of seed owing to the circumstances under which we are placed and have saved the best. We will grow considerably larger quantities next year of all the vegetables possible. I would suggest that any of you who are prepared to sacrifice a small piece of ground in this section to try our seeds should let us know. I think our pea seeds would suit you. I think our beans might. I do not think that our corn or tomatoes would, but if you could spare a few feet of ground to try our samples, it would be helping us in the information we are trying to gather from Halifax to Vancouver. We are gradually collecting a lot of very valuable information.

THOS. DELWORTH: I had the privilege this summer of going over a portion of the work, with garden peas especially. I do not need to point out the practical interest to vegetable growers. He showed me some of the plants and the increase

of yield was most marked. Mr. Logsdail is doing very valuable work, and I, for one, will be very glad to do some experimental work for him in regard to peas.

Prof. Crow: The programme this afternoon has embraced phases of work of great interest to vegetable growers. I do not need to point out to practical men the value of good varieties. We have had discussions from Mr. Clement at Vineland, from Mr. Logsdail at Ottawa and from Mr. Britton in our College at Guelph concerning the progeny and the improvement of varieties. Now, you are quite aware of the value of good varieties compared with the value of ordinary or inferior sorts. I do not need to point out what a great difference it makes to your banking account whether or not you have the best varieties obtainable. Furthermore there is no occasion to point out the value of the work which is being done at these institutions, and I simply wish to say on behalf of those engaged in this work—Mr. Clement, Mr. Logsdail and Mr. Britton and also our friend from Macdonald College—the satisfaction it affords us to know the extent to which you are interested in our work. You will realize that there is a large amount of time and expense being put on this sort of work. For myself, it affords me very great encouragement to know that the vegetable growers of the Province are interested enough in this particular work to develop the improvement of varieties, to have most of one afternoon devoted to discussions on that subject by college and experimental station men; and I am sure that nothing but good can come from the fact that the college men and practical men are getting together in cases of this kind. It has been charged frequently that we are very wide apart. However much truth there may have been in that, I hope the time is not far distant when we shall be working strongly together. There is a great work to be done. We need the assistance you can give us, and I am sure from the enthusiasm I have seen here this afternoon that you appreciate the work we have been trying to do.

The President: Because we are affiliated together all over the Province in the Ontario Vegetable Growers' Association it makes it possible for us to come together, professors and experts and practical growers. In the future there is a bright outlook for the practical and commercial end of it by working hand in hand with the experts of the colleges and in every way that the Government in their wisdom can afford to bring us together working for the betterment and uplifting of mankind through the growing of better vegetables.

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## SELECTION AND PRODUCTION OF BEST VARIETIES OF SEED FOR VEGETABLE GROWERS.

Paul Boving, Macdonald College, Que.

Is it advisable for Canadian farmers and vegetable growers to grow their own seed needed for the planting of root and vegetable crops?

From a general point of view there are several reasons why a man would be justified in answering this question in the affirmative.

1. In spite of the fact that many seedsmen do their very best to obtain good seed, the quality of that offered on the Canadian market is not always satisfactory, either in regard to trueness of type or to percentage and vitality of germination.

2. Good individual mother plants which have developed well under Canadian conditions, are liable to produce a seed which is better suited for these conditions

than foreign grown seed. "Like begets like." Numerous comparative tests have shown that home-grown seed gives better and higher yields than that imported.

3. It is false economy to import practically all seed needed for the production of a 35 million dollars' crop (20 millions for roots, 15 millions for vegetables) if this seed can be grown within the country.

Now there is a special reason—although necessity does away with reasoning—why we should agree in regard to seed growing, and that is:

4. The present terrible conditions in Europe, whence we obtain the greater part of our imported root and vegetable seed, will very likely cause a scarcity in the seed supply which simply must be covered through home production.

*Photo. by Paul J. Boving.*

Harvesting and selection of seed roots.

As a matter of fact, our energetic and foreseeing Seed Commissioner, Mr. Geo. Clark, has recommended his representatives to cause the following amounts of seed to be grown in Canada during 1915:

| | |
|---|---|
| Mangel seed | 472,500 lbs. |
| Field carrot seed | 16,800 " |
| Swede seed | 275,000 " |
| Radish seed | 4,200 " |
| Parsnip seed | 2,100 " |
| Cabbage seed | 1,600 " |
| Cauliflower seed | 105 " |
| Celery seed | 1,260 " |
| Garden turnip seed | 1,900 " |
| Garden beet seed | 6,300 " |
| Garden carrot seed | 1,050 " |

Although the general experience in regard to seed growing here in Canada is not a very wide one it can be asserted without any exaggeration that it is *possible* to grow seed from all these different kinds. It can also be claimed with a reasonable amount of certainty that it will be *profitable* to do so, at least for home consumption. Whether it will pay commercially, *i.e.,* if we will be able to compete with other countries, remains to be proved. It would, however, seem doubtful *a priori,* on account of their comparatively low and our decidedly high labor prices.

With a view to encouraging the production of selected seeds of those field root and garden vegetable crops that have not heretofore been commonly grown for their seeds in Canada, the Minister of Agriculture has authorized the payment of subventions to bona fide growers of seed during each of any of the ten consecutive years following after and commencing from June 1st, 1913.

| Kind of Seed. | Subvention per pound. | Number of pounds for which subvention may be paid, | |
|---|---|---|---|
| | | minimum. | maximum. |
| Mangel or Sugar Beet | .03 | 100 | 10,000 |
| Turnip or Swedes | .04 | 50 | 5,000 |
| Carrots, field or garden | .07 | 30 | 3,000 |
| Beets, garden varieties | .10 | 20 | 2,000 |
| Parsnip | .07 | 10 | 500 |
| Radish | .09 | 10 | 1,000 |
| Cabbage | .25 | 10 | 400 |
| Tomato | .50 | 10 | 100 |
| Onions | .25 | 10 | 2,000 |
| Celery | .40 | 10 | 100 |
| Lettuce | .20 | 10 | 500 |
| Cucumber | .20 | 10 | 100 |
| Water-melon | .20 | 10 | 100 |
| Musk-melon | .30 | 10 | 100 |

## Choice of Kind.

The first problem for the future seed grower is choice of kind. Shall he grow field root seed, or vegetable seed—one or several kinds? The answer depends partly on locality and personal inclination. As a rule it is, however, advisable to limit one's self, unless a man really wants to go in for seed growing on a large scale, and to concentrate on one or two crops which do well in the district in question.

Most of the plants with which we have to deal to-day are biennial, which means that the plant itself is grown one season, is stored over winter, and is made to produce seed when planted out the next spring.

Root seed is grown from either large, fully matured roots, or from smaller, not quite full grown roots, also called "stocklings." The man who starts in now will necessarily have to select large roots for mother plants. And this is perhaps just as well, because large roots are more easily judged for type, uniformity and other general characters than stocklings which do not show their good or poor characters nearly as distinctly. The production of seed from stocklings necessitates "stock seed" from choice mother roots, belonging to a pure strain. So far, Canadian grown stock seed has not been available, but at Macdonald College there are now several promising strains of mangels and swedes which may be propagated next year for distribution in 1916.

(The speaker here exhibited a number of large roots and stocklings of mangels, swedes and carrots.)

### Selecting.

Before selecting the seed roots the grower must have a clear conception of the type he intends to breed. What should be looked for is a sound, large, well developed, though by no means overgrown root, true to type and possessing a neat crown, smooth surface, full rounded tip and freedom from prongs. Certain varieties, especially among the swedes, are naturally somewhat prongy. In that case the breeder must aim to select specimens which have the prongs confined as much as possible to the bottom of the root.

It should be remembered that the main seed stalk grows out the following year from the heart, as it is called. On this account one must be sure not to injure this point when topping the seed roots. The top may either be carefully twisted off, or still better, it can be cut off one to two inches above the heart.

(Demonstration of cutting the crown.)

### Storing.

Seed roots spoil very easily, like most other good things, and should therefore be handled carefully. The sooner they can be stored, after pulling, in a cool, not too dry place the better. Where a good root cellar is at hand it is advisable to store them there, if possible in standing position and surrounded with peat soil or moist sand. Otherwise it is better to store them in an outside pit on well-drained ground. The pit is made about 6 feet wide, and the roots are piled up 3 feet high, with slanting sides so that the covering material will not slide down. After piling, the pit is immediately covered with a thin layer of straw, just enough to keep a 4 inch layer of soil from falling in among the roots. The top of the pit is left without any soil so that the heat may escape more readily until the weather gets colder. When it commences to freeze the pit is further covered with 6 inches of straw, followed by 6 to 8 inches of soil, and when zero weather sets in it must finally be protected with a layer of strawy manure. To ensure quick cooling of the roots it may be advisable to run a 4-inch ventilating shaft at the bottom of the pit and to draw exhaust pipes from this shaft to the top, but the openings should be closed on warm days and must, of course, be stuffed with straw, or with some other insulating material, when the temperature goes down below 28 degrees. Seed roots do not stand drought very well, and many growers, therefore, prefer to place the pit on, or at least in the vicinity of next year's seed field in order to shorten the haul from pit to planting place. In this connection it might be well to remember that the planting of the seed roots in spring time should be done on a cloudy and calm day in preference to a day with bright sun and heavy wind, which tend to dry out the exposed roots and consequently to lower the yield of seed.

### Planting.

Being naturally cross-fertilized, roots of different varieties, belonging to the same kind, should not be planted close to one another. Two mangel varieties may be safe if they are separated 100 to 250 yards, especially if the fields are divided by a wood lot, or by a field of tall growing corn. Swedes and turnips,

*Photo. by Paul A. Boving.*

Good selection of Swedes with neat crown and well-confined prongs.

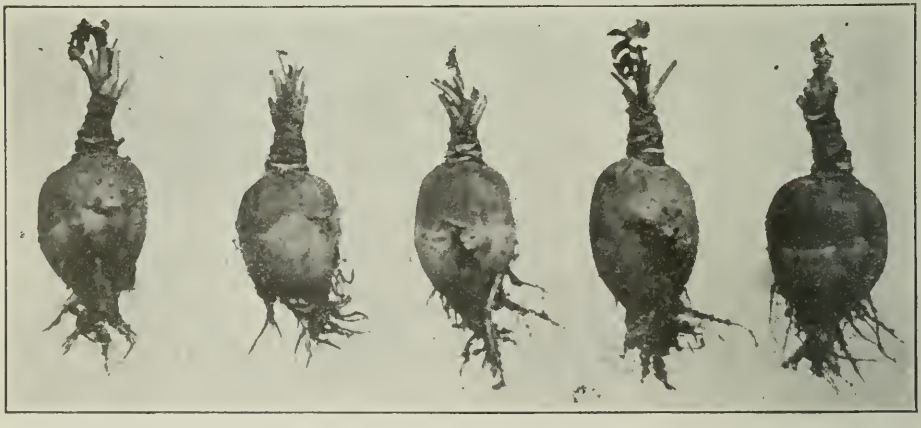

*Photo. by Paul A. Boving.*

Poor selection of Swedes with rough prongs and coarse crowns.

again, require even wider distances. They not only cross with varieties of their own kind, but also intercross, *i.e.*, a swede may cross with a turnip and *vice versa*. In districts where the Bird Rape (*Brassica campestris*) is prevalent, pains should be taken to exterminate this weed, as it is a danger in this respect for both swede and turnip seed production. Carrot varieties cross with each other and with the wild carrot. Where this weed is common it is simply impossible to grow first class carrot seed.

Land intended for seed growing should above all be rich, well-drained and if possible, sheltered from heavy winds. Liquid manure is a splendid fertilizer for seed roots. On most soils it is advisable to supplement the liquid manure with 300 to 400 lbs. of acid phosphate per acre. Where a general mixture of commercial fertilizers is used it is better to supply the nitrogen with sulphate of ammonia than with nitrate of soda, as the latter tends to rush the growth of the young seed stalks too much, making them weak and less resistant to wind pressure.

After the land has been properly worked it should be well packed with a roller and marked before planting. Common distances are 24 inches by 24 inches for small roots and 30 inches by 30 inches for large roots. Three men, when used to the work, can plant 3,000 roots in a day. One man lays out the roots in their places, another digs the holes and the third man puts in the roots. The root in the first hole is covered with the soil from the second and so on. Where the soil is deep enough the roots should be planted firmly straight up and down, and should be set so deep that the crown barely reaches the surface. With long shaped varieties and on shallow soils it may be advisable to tilt the root, always remembering to plant them as deep as the soil will permit with the crown reaching the surface. If the plow is used the roots are placed against the land side in the opened furrow. It is a good plan to cover them partly by drawing loose earth with one stroke of the foot to the bottom of each root so that they may keep in position when the furrow is thrown back. Unless, however, the workers are familiar with this method, it gives scarcely as satisfactory results as the spade planting method which causes a firmer and more regular stand. The root-seed land should be kept cultivated as long as possible in order to preserve the moisture. On smaller areas it pays well to use the hand cultivator between the rows, when the length of the seed-stalks prevents the use of the horse cultivator.

## Harvesting and Threshing.

It is very important that the seed be harvested in right time. Very often the field does not ripen quite uniformly, and all the seed on one and the same plant never matures simultaneously. The first formed seed on the lower parts of the seed stalks ripens earlier than the rest, and as this seed is stronger and consequently more valuable than the later formed seed, the grower should endeavor to secure it before it falls off. Mangel seed is ready when the true seed inside the brownish cluster shows a mealy surface when cut with a knife. It is time to harvest swede seed when the bottom siliques or pods are getting brown on the outside and the upper ones have attained a yellowish color.

Where seed is grown in small quantities it is of course possible to dry the seed stalks by hanging them up in a well-aired place in the house or in the barn. In this case a sheet or a tarpaulin should be spread out on the floor so that no seed may be lost. On a large acreage the stalks must be cured in the field. For

this purpose the seed-stalks are tied in loose sheaves and left in open stooks until such time as they may be dry enough for hauling to the barn. Here they should be threshed as soon as possible. The seed is cleaned on the fanning mill and with the aid of hand sieves, and is spread out in thin layers which should be shuffled daily until quite dry. Then it may safely be put in bags and stored away.

### Radish.

(Crosses with other radish varieties.)

Seed early in cold bench. If planted too thick no top roots are formed, therefore, there is thin seeding. In May the seed roots are planted out in 10 inch squares and watered. The seed generally ripens in August. When ripe the plants are cut off, tied in small bundles and left to dry in the field.

Threshing should be done with good care so that the seed is not crushed or pounded out of the peel. The seed is easily cleaned on a good fanning mill. Where good stock seed is available and where one has difficulties to supply the seed plants with water, 3 to 4 seeds may be laid in each planting hole on above mentioned distance. The planting should, of course, be done as early as possible.

When bulbs have formed the best developed are left to produce seed. This method, however, is not so reliable for obtaining true type, unless original seed is extra good.

### Parsnip.

(Crosses with other parsnip varieties.)

One of the hardiest of all vegetables and can therefore without any danger be left in the ground over winter. In springtime the best roots are selected and planted out in 24-inch squares.

Seed does not ripen uniformly (August-September) and the umbels must therefore he harvested in turn when the seed has attained a brownish color. Umbels are spread out to dry or are put in bags of open cheese-cloth and hung up in an airy place.

### Cabbage.

(Crosses with other cabbage varieties.)

Three different methods are commonly used:

1. Harvesting in October-November, storing in cellar or pit, and transplanting in spring.

2. Harvesting in October-November, and immediate transplanting in trenches where it is left to grow seed.

3. Growing in trenches where all *good* plants are left over winter for seed production next spring.

In the two last cases the soil is hilled up against the cabbages in the fall and the plants are further protected against frost with spruce branches, leaves, or some other insulating material.

If the heads refuse to burst in springtime one can assist the flower stalks by making a cut crossways over the head, remembering that the cuts should not be made too deep. The cabbage plants flower in June, and the seed ripens rather unevenly in July. The harvesting consequently has to be done successively.

*Photo. by Paul A. Boving.*

Five Mangels of an exceptionally well-bred strain of Yellow Intermediate.

*Photo. by Paul A. Boving*

Five Mangels of a good, though somewhat prongy strain of Yellow Intermediate.

### Cauliflower.

(Varieties intercross.)

Seed growing from this plant is rather difficult and circumstantial and this is the reason why the seed is generally so expensive.

The method, first in use, to store the plants over winter in cellar or pit, has been almost entirely abandoned as it invariably results in considerable rotting and loss of plants.

In localities with mild winters the seed is planted in September in benches which are kept open as much as possible over winter. The cauliflower is then either transplanted early in spring or is left in the benches to flower and set seed. This method would scarcely be adoptable around Toronto where the winters are perhaps too severe to allow proper airing of the benches. For Canadian conditions we shall probably have to grow the plants in greenhouses so as to be ready to plant out in spring.

The cauliflower requires a good deal of moisture, and it is questionable if seed can be grown successfully without irrigation or watering.

All plants which have not formed perfect heads before the 1st of July should be discarded for seed production, as the seed will ripen too late. The flowers appear in July-August, and the seed matures in September-October. When ripe, the stalks should be gradually cut off and spread out on a sheet in a dry and airy place.

### Celery.

(Varieties intercross.)

In localities where the winters are not too severe it is possible to leave the seed plants in the ground. Good reliable foundation stock is, however, necessary for this method. The plants should be covered in hard and dry frosts. It is not advisable to bleach the seed plants, because the bleaching always causes a certain amount of weakness.

Seed ripens in August-September. Maturity is easily recognized as seed takes on a light brown color. The stalks are cut off and are left to dry in the field. When quite dry the seed is threshed and cleaned.

Where winters are more severe, plants must be taken out of the ground and stored in a cellar or a pit.

### Onions.

(Different varieties cross very readily with each other.)

The onions are kept in a frost-free place. If, perchance, they should freeze it is advisable to leave them as they are until they have thawed out, as they are very liable to rot if touched.

As soon as the weather permits the seed onions should be planted out in good, rich soil, 15 inches apart. In favorable localities the onions can be planted out in the fall and keep, as a rule, well. Land should be kept clean and cultivated as long as possible, *i.e.*, until the seed stalks appear. These are very tender and break easily.

The seed generally ripens in August. It is time to undertake the harvesting when the capsules begin to burst and the seed becomes black and solid. The

capsules are cut off and are spread out in a thin single layer in order to prevent the seed sprouting. For this purpose they should be moved frequently. Extreme care in drying is necessary as the onion seed spoils very easily.

Good Seed Root of Intermediate Type.

Good Seed Root of Globe Type.

Onion seed does not leave the capsule readily, and should, therefore, be threshed in frosty weather.

## Lettuce.

Seed is either planted as early as possible on free land and later thinned out to ten inches between plants, or, and perhaps still better, the plants are planted out from bench or greenhouse on well prepared land.

The earlier it commences to flower the better, as it will then generally escape the July-August rains, which impair the formation of seed to a considerable extent. In "wet years" the seed yield may even be entirely spoilt, while comparatively dry summers mostly result in a satisfactory seed yield.

When the lettuce seed is ripe, which is easily distinguished by the "feathering" and the hardening of the grain, the stalks are cut, if possible, on a morning with dew, are tied in small, not too tight sheaves, and are left to dry in small stocks. At times one gets quite a number of unripe seed. This is easily taken out through "skimming" in round sieves.

### Conclusion.

In Ontario, seed has been grown successfully from a number of the plants under discussion. Root seed and vegetable seed have been produced at the O.A.C. College, by the Ontario Seed Co., Waterloo, and by other growers in the Province. At Macdonald College, and on trial plots in different counties in the Province of Quebec, we have grown seed from mangels, swedes, turnips and carrots with excellent results as far as quality is concerned, and with quite satisfactory, though somewhat varying, yields.

In 1913 the Dominion Sugar Company, Berlin, Ont., planted over 45 acres with sugar beets for seed purposes. Swede seed production is well known in the Maritime provinces, especially in Yarmouth Co., N.S., where one man has made a success of it for not less than seventeen years. There is thus sufficient evidence that root and vegetable seed can be grown in Canada, and the sooner our farmers and vegetable growers give it a good trial, the better for their own economy and for the commercial balance of the Dominion.

J. Lockie Wilson: Mr. Boving's paper will be greatly appreciated by our members, containing as it does so much valuable information on the growing of seeds.

Here is a letter from the office of the High Commissioner in London addressed to the Director of Experimental Farm which has been passed on to me:

"There is a marked shortage of horse radish in this country, a product heretofore being imported largely from Germany, and we are being asked whether horse radish is grown in Canada in sufficient quantity for export. None of the publications available here show the extent to which the vegetable is grown, and if you could refer me to the names of any growers likely to interest themselves in the trade I should be glad to refer them to your correspondents."

If any of you know where horse radish can be grown in large quantities, or are likely to be grown, I would be very glad to have the information.

A Delegate: The only place I know where they are growing horse radish to any extent is near St. Louis, Missouri.

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## ADDRESS.

### Hon. J. S. Duff, Minister of Agriculture, Toronto.

I am glad to take this opportunity of congratulating the members of the Ontario Vegetable Growers' Association upon the work they have been engaged in for some years, and which, if we are to believe your reports and what these connected with the Vegetable Growers' Association say, has been productive of a very large amount of good. The times in which we live are of such a character that no matter in which direction we turn our thoughts they must naturally be turned towards the object which it is our desire to attain, and they must necessarily be

turned to the object in view with a good deal of intensity and force in order that they may be successfully accomplished. I have thought for sometime that one great object of meetings such as this would be to bring vegetable growing, and things that are allied to it on a more common basis; instead of having so many varieties of one sort of vegetable we should grow one sort, a sort, of course, that was unquestionably the best and would measure up to the average yield of the rest. Take potatoes, for instance. There is no doubt in my mind that if we could get people to make up their minds what was the best sort of potato in this Province to grow, I do not think you would see the New Brunswick potato realizing the high price it does compared with the Ontario potato. For some reason or other there seems to be a diversity of opinion on the subject. Different men will grow a different kind of potato, and they think their potato is very excellent, and no doubt very many of these potatoes are excellent; but it seems to me that we have not attained the position we ought to occupy in connection with the growing of potatoes in this Province. If a carload was shipped from Toronto, London, or Barrie, it would be simply labelled "Ontario Potatoes," and the people who were buying would know they were the variety that the people of Ontario were growing because of their special adaptability to the soil and climate of this Province. That is equally true of other things. I think the time has arrived when we should endeavor to grow our own seed. I do not know what the outcome will be; but we have been importing our seed very largely from Germany. It has included all sorts of vegetables and field roots; mangels and seeds of that description The effect of this war will possibly be of such a character that I think it very likely that there will be a great scarcity of seeds for carrying on the work which not only the vegetable growers but the farmers generally in this Province and throughout Canada are engaged in. It seems to me that there should be a field in that direction that might well occupy our thoughts, and in the course of a short time—Rome was not built in a day—we would be very largely self-supporting so far as our seeds are concerned. Now, I may be all wrong in my premises, but I am just throwing out some thoughts which have come to me without consulting anybody. There must be an immense amount of money spent on seeds in the various markets, and my idea has always been that anything we can produce at home, anything that can be spent at home, that money returns a value that cannot possibly accrue to business interests or to the Province, if that money is spent abroad, I care not what you speak of of a perishable nature. If purchased in a foreign land the gold is sent forth, and unless we send something to bring the gold back, then when that article, or whatever it may be, has been used, the country, except for the uses the article served, is out of that gold. I am glad to see that the newspapers of this Province to-day advise its people to endeavor to use British made goods.

Perhaps the people of Canada have never had that brought home in a way which they have more realized than they do at present. The war situation has brought that about in a way which I may refer to a little later.

There is another phase of your work to which I should like to allude. We are circularizing the Province through our district representatives, through the newspapers, and through our farmers throughout the Province to do everything possible in the way of fall wheat planting in preparation for next year's crop, believing as we do, that we are doing an actual service to the farmers and to the Empire. To-day, while 30,000 Canadian soldiers are on Salisbury Plain preparing to go to the front, you who are associated in this Convention are working equally as well in the interests of the British Empire if adequate preparation is made for next year's crop. A few days

ago I saw that last year Great Britain imported from Germany over £2,000,000 worth of potatoes, or a matter of $10,000,000. This year, in this Province, we have a tremendous potato crop; perhaps the greatest we have ever had. I have wondered since reading that if that does not mean that next spring, perhaps in the latter part of the winter, we may see quite a demand for Canadian potatoes to supply the British market. That is a question which might very well engage our attention. We might, perhaps, consider the advisability of the appointment of a small committee to watch the trend of events, and advise the potato growers of the Province as to what is the best attitude to take as the months go by. There are always these things which make our condition at present more than the ordinary, because the times in which we live are not ordinary times. We are living in a time of war just as much as if we lived beneath the shadow of St. Paul's Cathedral or Westminster Abbey, and in that way you are meeting a demand that has been created by the war, and in that way you will be helping those who have

*Photo. by Paul A. Boving.*

Seed bearing mangels at Macdonald College.

been toiling all summer in order to have a splendid crop of potatoes. I have no doubt that we shall see almost all the products of our farms realize a very much higher price in a few months than they do now. Everything points in that direction, and, consequently, the present condition of affairs should have a very beneficial effect not only on the handling of the crop this year but next year's crop as well.

There is another subject that I have had in my mind for some years, and that is the marketing of the crop. I do not know that I would do very much if I set out to handle the market question, but what has occurred to me with reference to this City is this: that it is very desirable there should be four or five good market places in this large city where the farmers could take their vegetables, their fruit, butter, eggs and various small products of the farm instead of having to drive to one place. Toronto is so large that one cannot possibly get in touch with the great consuming public of this city with only one market, and I have thought it would be a magnificent thing if some arrangement could be made

whereby the Mayor and Controllers of this city could see their way clear to have three or four or five market places where the people could come from the east, north or west, as the case might be, instead of going, as they have been usually doing, down to the St. Lawrence Market. I think that is another matter which might very well engage the attention of a gathering such as this. While, perhaps, it might not mean very much to many of you who are not interested, particularly, in Toronto matters, it would mean a great deal to the great body of vegetable growers who are small farmers and adjacent to this great city.

I do not propose to take up any more of your time, but I want to say in conclusion in regard to the matters I spoke of first, that if we are able to make progress along those lines I believe that in a few years this Province will become the great seed bed for the whole Dominion of Canada. I do not know how it strikes you, but I am of opinion that Ontario is, perhaps, better suited for that kind of thing than any of the other Provinces of this Dominion, and the success or otherwise of the work, should it be undertaken, will be to prove whether it is or not. We have advantages in many respects over many of our sister Provinces, and we will not be doing our duty to ourselves or to them if we do not endeavor to take full advantage of such possibilities as are ours, and may not be theirs.

THE PRESIDENT: We are very pleased to have heard such a splendid, instructive and inspiring address from the Minister of Agriculture. I would like to assure him that we are following along the lines he suggested in his admirable address. You will notice by our programme that we have had under consideration the question of seed production, and I think that the conditions prevailing in the world to-day will hasten on the very thing we have in view: the production of our own seeds. The Hon. Mr. Duff also referred to the use of British made goods. Several of the speakers have mentioned that, and I think that is one of the things we should all try to do, because that is one of the ways we can help Ontario, Canada and the British Empire. Let us see to it that we use no other than British made goods. As individual members of this Association we are patriotic and always stand by the old flag, and are ready to a man to help in any way we can.

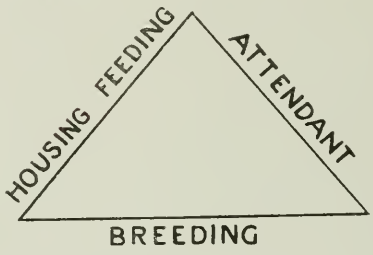
HON. J. S. DUFF: I have just been glancing over your report of last year, and it appears to me that a great deal of the information it contains is too old by the time it gets into print. I have often thought, and I have talked it over with those connected with our Department, that if you could come to some sort of an agreement, or reach certain conclusions, and you felt pretty safe that you were on right lines, an effort should be made to let the vegetable growers have the benefit of those conclusions before they start in on their spring work. If that could be done I think the Association would be doing an immense amount of good; in my judgment, a great deal more good than by sending out these reports when they are a year old. I am only speaking of your reports as I speak of others. Your whole agricultural possibilities could be helped out wonderfully if you could get in touch with the people at the proper time, whether it be the vegetable growers in the spring, or later on, as the various matters are being attended to.

## POULTRY RAISING IN CONNECTION WITH VEGETABLE GROWING.

Prof. W. R. Graham, B.S.A., O.A.C., Guelph.

Gardening and poultry are frequently considered as being so much opposed to one another that many vegetable growers would not consider poultry keeping at all. Poultry are very fond of two things that the vegetable growers have in abundance, that is tender green food and freshly stirred soil. No doubt there are seasons and circumstances where it is advisable to confine the poultry to keep them from the growing crops. In taking up this question there are some things in common, and a discussion of the general principles of poultry culture, together with possibilities of growing poultry and some kinds of vegetables on the same piece of land may be seriously considered.

Successful poultry keeping depends upon the stock, housing, yarding, feeding and the attendant. To present these ideas a little more concretely allow me to draw your attention to the diagram.




The foundation or base is breeding. Given the best of care and attention, one will not get the maximum results from a flock of mongrel poultry. Science in recent years has explained how some characters are inherited, but many results still remain for scientific explanation. The art is simply science applied. Science has suggested that the highest egg producers inherit the ability to lay a large number of eggs from their fathers, and they in turn inherit high production from both mother and father.

A strong, vigorous constitution is of prime importance, no matter whether the bird is especially bred for meat, eggs or general purpose. It is the mainspring on the driving force on which all other characters depend.

The question of the hatching power of eggs, broodiness and many others that might be mentioned are more or less closely related to breeding problems.

Let us now consider the left side of the triangle. This deals with environment; that is housing, feeding, yarding. Poultry houses require to be dry, light, free from direct draughts over the birds and to have an abundance of fresh air. There are many kinds of houses that will meet these conditions. Warmth is not nearly so serious a factor as many suppose.

Feeding is a problem, and must be varied almost annually, as prices of grains vary from year to year, also the feeds that may be at hand vary from time to time.

In a general way poultry require about two-thirds of the bulk of their food to be of grain and one-third of vegetable or grass. They also require in the neighborhood of ten per cent. of the grain food to be animal foods, such as sour milk, meat scrap, etc. To this list must be added grit and oyster shell, broken egg shell or old plaster.

In the feeding of poultry is where the vegetable grower has a chance to produce poultry or poultry products cheaply. Waste cabbage and lettuce probably have no equal as poultry green feeds. Cull beets, carrots, potatoes, etc., when cooked and mixed with meal, are very much relished by poultry. I recall an instance when the cost of feeding of a large number of hens was reduced one-third simply by using cooked turnips. Not only do vegetables reduce the cost of feeding, but they assist very materially in maintaining the general health of the flock.

Where one is growing vegetables there will, no doubt, be seasons where the fowl must be confined to small runs. Make the run or range as large as possible; if it can be made movable, so much the better. Asparagus makes an ideal summer range for poultry. The manure is excellent for the plant, also the poultry tend to keep down the beetles and the asparagus supplies ideal protection for the hen.

Unless poultry are very numerous a crop of chickens may be grown along with vegetable crops, such as potatoes, asparagus, carrots and even tomatoes, until such time as the tomatoes commence to ripen. My experience in such cases would be that not more than two hundred chickens should be grown per acre, better one hundred per acre. Under such conditions the chickens must be fed all the grain they will eat, preferably from hoppers or where they can get at it at all times. Chickens become destructive when they get grain hungry, or where there is a shortage of green food. In such crops as has been suggested, the almost constant cultivation germinates many weed seeds, which make the choicest of green food while young and tender. Prolonged dry spells and neglect to supply abundance of grain make the chicken try something different. Generally speaking, young birds are not nearly so destructive as are the older ones. Where a person can grow two crops upon the land at one time there is a better chance of making money.

As for grain, wheat, corn and rolled or crushed oats are the staples. Barley is fair feed, and buckwheat may be used as a substitute for corn. No animal food equals sour milk. Beef scrap, green cut bone, animal meal, etc., are good when sour milk is not to be had.

Occasionally hens get too fat to lay, but most hens are too lean. Very rarely do you see a lean hen begin laying—some hens lay themselves lean. A very fat hen generally means a poor layer, and commonly the sooner she is killed the more money is saved.

The attendant (or person caring for the flock) has much to do with its success. You may have the best breeding and feeding, but the lack of attention in regularity of feeding, watering, cleaning houses, etc., means poor returns. Dirty drinking vessels and dirty drink kill a large number of hens. Filthy houses and a good crop of hen lice eat up the profits. The attendant should cultivate a friendship for the flock. Do not slam doors and kick pails, to say nothing of the hens, and expect good results.

In conclusion, a limited number of poultry will pay the vegetable grower in supplying his table with meat and eggs; in disposing of unsaleable vegetables; in destroyed insects and supplying manure for some of his crops. Large numbers might not be profitable.

Mr. J. Lockie Wilson: What breed would you recommend vegetable growers to produce and raise?

Prof. Graham: Commercially, in my judgment, there are but three breeds of chickens in existence. There are over 180 breeds of chickens, and any one of them will do well under particularly favorable conditions, but when you get down to

At the Western Fair.

where everything counts, such as the breed, the eggs they lay and the price, I would select Plymouth Rocks, Rhode Island Reds, and White Leghorns.

A DELEGATE: What is your favorite?

PROF. GRAHAM: If I wanted a general purposes chicken it would be Plymouth Rocks. If I wanted to raise 2,000 or 5,000 chickens there is just one breed of chicken you can do it with, and that is White Leghorns.

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## SELECTING AND CUTTING SEED POTATOES.

A profitable potato yield is largely based upon the planting of good and properly prepared seed. Degenerated or run-out varieties of tubers, like inferior human beings, may be slightly benefited by ideal surroundings and culture, and yet they are never capable of reproducing desirable progency.

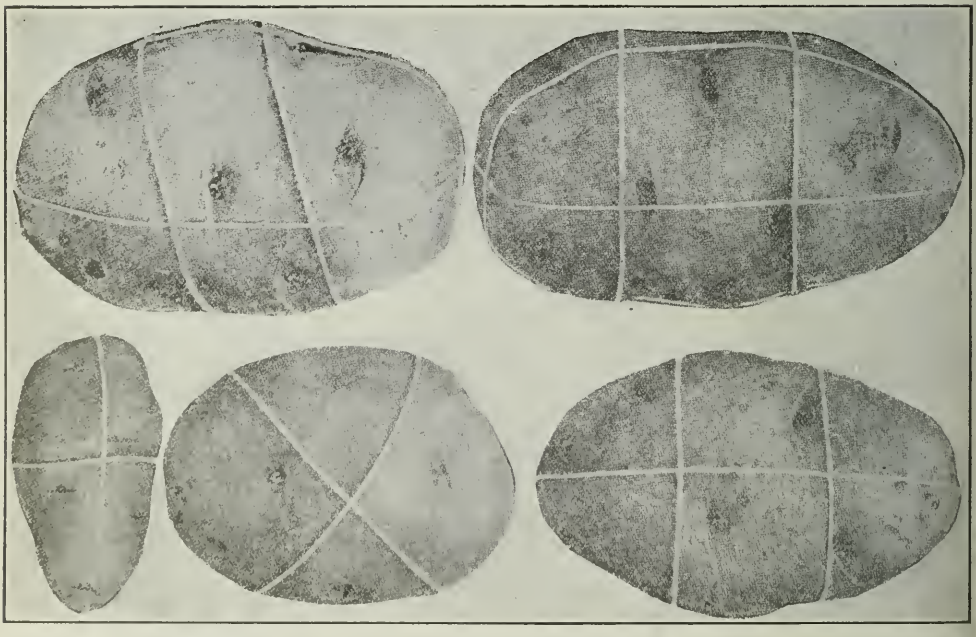
Unfortunately, even the standard varieties are not perfect. Each one is made up of high and low yielding strains, and the grower who takes the pains to sort the good from the bad is certain to reap a reward. The methods of selection are too numerous to mention here, but they all are based on one principle, the use of single tubers for mothers and the elimination of the undesirable offspring. Such painstaking selection is suitable only for the seed plot, which, by the way, should be present on every potato farm, but for the field crop less accurate methods have to be employed. The following precautions, however, can be taken without the expenditure of much labor and money.

Discard all the small tubers for seed purposes, as the greater part of them were produced by the undesirable strains. Careful experiments have proved that the use of tubers, weighing at least five ounces, is a financial gain. Avoid the use of abnormally tapering, deep-eyed, and elongated tubers. These are degenerated, or run-out and never produce satisfactory results. On the contrary, select for seed purposes, where practicable, tubers which are blocky, well-shaped, true to variety and type, and free from all transmissible injurious diseases.

The proper cutting of the potato tuber is also a very important factor in the production of good yields. Speedy methods are necessary, but they must not cause bruising or do inferior work. Bruises make the seed more susceptible to rot, especially in damp soils, and pieces lacking eyes are worthless. Various cutting machines have been devised, but, on the whole, they are less reliable than the human hand and eye. A free knife is commonly used for cutting the tubers, but a fixed knife, as illustrated in figure, enables the operator to work with much greater rapidity. It will be noted that the seed is first halved and quartered lengthwise, keeping all the parts together, and then cut crosswise as many times as is considered necessary. The illustrations of individual potatoes indicate different cuts which may be made on variously shaped and sized tubers. Where the free knife is used and the eyes are scarce, many growers begin by cutting off pieces at the stem end, diagonally across the tubers, and when just enough of the seed end is left for two pieces, divide it equally, and in such a way that the eyes are evenly distributed. Whatever method of cutting is practiced, cut the tubers into pieces which have at least one good eye, a blocky shape and a uniform size. Blocky pieces have the advantage over the long and slender ones in that they are better suited to the planter and less liable to rot. Tubers of the early varieties, as the Early Ohio, are generally cut into pieces weighing from three-quarters to one and a quarter ounces; and those of late varieties into pieces varying from one to two ounces in weight. It is impossible to give the exact sizes and weights, for they must necessarily vary directly

Stationary Knife for Cutting Seed Potatoes.

(Note how potato is held until last cut is made.)



Methods of cutting various types of Potatoes for seed.

with the cost of the seed, the distance of planting, and the fertility of the soil. In Europe whole seed is commonly planted, but here it is considered too expensive. Good seed potatoes that are properly prepared should be given the most careful consideration, for they can spell either failure or success.

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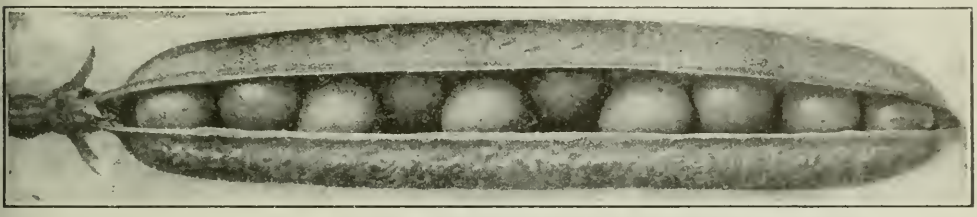
## REPORT OF LAMBTON GROWERS' CO-OPERATIVE ASSOCIATION.

The Association has a hundred and twenty-five members that market nearly all of their produce through the Association amounting to over two hundred car loads, and during the week of November 7th were still loading from three to five cars per week. We have purchased seeds, fertilizers and fruit baskets through the Association, also about five cars of seed potatoes at a much less figure than we could have bought them any other way.

The main thing in this movement is to have a shrewd business man who can keep in touch with the markets as manager. This the Lambton Growers' Co-oper-



Well-filled Pod.

ative Association has. The Association has held several interesting meetings in 1914, and has advanced membership fee to one dollar per year.

The turnover for the year was about $50,000. We donated one car of vegetables to the soldiers at Valcartier.

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## GARDENING ILLUSTRATED.

A. H. MacLennan, Macdonald College.

The views I wish to show this evening I picked up on my trips through Canada and the United States. Some of them will be familiar, but I hope that all of them will give you a better idea of how other men in our line do their work. It is impossible, however, to write down much of what the pictures reveal.

The first few are scenes taken here and there showing market gardening as a whole. First is a wind-break something very necessary on most truck farms. Then views of market gardens, many of them taken around your own city.

One of the most important things we have seen is the double cropping. We find celery seed planted in rows 5 feet apart early in the spring. Between we find crops like onion sets, beets, spinach, lettuce and beans. One man had tomatoes

with lettuce between, and a foot from each row of tomatoes. He had planted Golden Bantam Corn which would be ready before the tomatoes needed the ground.

Near Boston one sees most of the tomatoes staked. The plants are set 18 inches by 30 inches. The stakes are made of 1½ inch by 1½ inch lumber and 6 to 7 ft. long. They are driven 18 inches to 2 ft. into the ground. Where the situation is exposed to heavy winds they run a wire at the top fastened to posts set every 30 to 40 ft. and 3 to 4 ft. in the ground. All plants are run to single stems as in the greenhouse, and fruit is said to ripen ten days earlier.

Throughout the Connecticut river valley one sees a very large acreage devoted to onions and tobacco, some of the tobacco being grown under cheese-cloth. It sells at about five times the price of tobacco grown under ordinary conditions. It is probable that gardeners could use cheese-cloth for the purpose of growing lettuce during hot, dry weather. It has been done to some extent in the States.

The address was illustrated with a number of excellent lantern slides.

The Convention was brought to a close by the delegates singing the National Anthem.

## PRIZE WINNERS IN FIELD CROP COMPETITIONS, 1914.

| Prize Won. | Competitor and Address. | Variety. | Score |
|---|---|---|---|
| **District 1.** | | | |
| Judge—F. F. Reeves, Humber Bay. | | | |
| *Onions.* | | | |
| 1st | H. Coldrey, City View | Red Globe | 92 |
| 2nd | Cooke Bros., Cataraqui | Yellow Globe Danvers | 87 |
| 3rd | Geo. Reilly, Aylmer, Que. | Red Globe | 85 |
| 4th | I. A. Farquharson, Ottawa | Red Globe | 83 |
| *Tomatoes.* | | | |
| 1st | W. Trick, Ottawa | Chalk's Jewel | 94 |
| 2nd | Jas. Cox, Ottawa | Cox's Pink | 91 |
| 3rd | I. A. Farquharson, Ottawa | First of All | 86 |
| 4th | C. McConnell, Hull, Que. | Earband | 83 |
| *Celery.* | | | |
| 1st | Cooke Bros., Cataraqui | Paris Golden and Plume | 93 |
| 2nd | J. Baker, Cataraqui | Paris Golden and Plume | 80 |
| *Potatoes.* | | | |
| 1st | B. Lancaster, Cataraqui | Ohio | 93 |
| 2nd | Cooke Bros., Cataraqui | Ohio | 85 |
| 3rd | E. K. Purdy, Kingston | Ohio | 81 |
| 4th | Geo. Reilly, Aylmer, Que. | Early Fortune | 76 |
| **District 2.** | | | |
| Judge—J. J. Davis, London. | | | |
| *Onions.* | | | |
| 1st | John Tizzard, Humber Bay | Danvers | 94 |
| 2nd | Chas. Aymer, Humber Bay | Yellow Globe Danvers | 92 |
| 3rd | T. Delworth, Weston, R.R. 1 | Yellow Globe Danvers | 90 |
| 4th | F. F. Reeves, Humber Bay | Yellow Globe Danvers | 89 |
| *Tomatoes.* | | | |
| 1st | Jno. Tizzard, Humber Bay | Earliana | 98 |
| 2nd | Jas. Dandridge, Humber Bay | Early Pink | 96 |
| 3rd | C. H. Aymer, Jr., Humber Bay | Chalk's Jewel | 94 |
| 4th | C. Aymer, Humber Bay | Chalk's Jewel | 93 |
| *Celery.* | | | |
| 1st | A. Carlton, Lambton Mills | Paris Golden | 99 |
| 2nd | P. A. Bell, Humber Bay | Paris Golden | 96 |
| 3rd | J. Harris & Son, Belleville | Paris Golden | 95 |
| 4th | F. F. Reeves, Humber Bay | Paris Golden | 92 |
| *Potatoes.* | | | |
| 1st | F. F. Reeves, Humber Bay | Ohio | 91 |
| 2nd | E. W. Grummett, Echo Place | Eureka | 88 |
| 3rd | Jas. Dandridge, Humber Bay | Cobbler | 82 |
| 4th | John Tizzard, Humber Bay | Cobbler | 78 |

PRIZE WINNERS IN FIELD CROP COMPETITIONS, 1914.—*Continued.*

| Prize Won. | Competitor and Address. | Variety. | Score |
|---|---|---|---|
| Districts 3 and 5. | | | |
| Judge — Jas. Dandridge, Humber Bay. | | | |
| *Onions.* | | | |
| 1st | W. E. Crandall, Ingersoll | Danvers | 89 |
| 2nd | Thos. Barwell, Fenwick | Red Globe | 88 |
| 3rd | W. Hyslop, Ealing | Danvers | 87 |
| 4th | F. Gard, London, R.R. 7 | Danvers | 86 |
| *Tomatoes.* | | | |
| 1st | D. Dempsey, Stratford | Byron Pink | 93 |
| 2nd | Elmer Hamilton, Dunnville, R.R. 5 | | 92 |
| 3rd | A. McInnis, London | Early Pink | 91 |
| 4th | R. Dengate, Ealing, Box 52 | Byron Pink | 89 |
| *Celery.* | | | |
| 1st | P. J. Jean, London, R.R. 8 | White Plume | 93 |
| 2nd | W. Trott, London West | White Plume | 92 |
| 3rd | G. H. Poad, London, R.R. 8 | White Plume | 91 |
| 4th | N. Sanderson, London, R.R. 7 | Paris Golden Yellow | 83 |
| *Potatoes.* | | | |
| 1st | G. W. Bycroft, London, R.R. 7 | Ohio and Goldfinder | 86 |
| 2nd | J. J. Davis, London, R.R. 7 | Ohio | 83 |
| 3rd | W. E. Crandall, Ingersoll | Goldfinder | 79 |
| 4th | G. H. Poad, London, R.R. 8 | Cobbler | 76 |
| District 4. | | | |
| Judge—H. Hachborn, *Echo Place.* | | | |
| *Onions.* | | | |
| 1st | Chas. Buchner, Sarnia | Yellow Globe Danvers | 96 |
| 2nd | Fred. Somes, Sarnia, R.R. 3 | Yellow Globe Danvers | 92 |
| 3rd | R. A. Hooper, Sarnia, R.R. 1 | Yellow Globe Danvers | 91 |
| 4th | V. Robinette, Tecumseh | Red Wethersfield | 90 |
| *Tomatoes.* | | | |
| 1st | Chas. H. Wilson, Sarnia, R.R. 3 | Chalk's Jewel | 90 |
| 2nd | P. E. Ducharme, Tecumseh | I X L | 87 |
| 3rd | W. A. Thresher, Sarnia | Earliana | 80 |
| 4th | J. Petrie, Tecumseh | Ignotum | 79 |
| *Potatoes.* | | | |
| 1st | Jared Moore, Sarnia, R.R. 1 | Ohio | 99 |
| 2nd | Chris. Dent, Sarnia, R.R. 3 | Cobbler | 94 |
| 3rd | H. R. Dent, Sarnia, R.R. 3 | | 92 |
| 4th | Henry Broughton, Sarnia | Ohio | 91 |

## PRIZE WINNERS AT THE CANADIAN NATIONAL EXHIBITION, 1914.

*Vegetable Field Crop Competitions.*

### Tomatoes.

1st Prize..C. Aymer, Humber Bay.
2nd " ..C. H. Aymer, Jr., Humber Bay.
3rd " ..I. A. Farquharson, Ottawa.
4th " ..D. Dempsey, Stratford.
5th " ..R. Dengate, Ealing.
6th " ..C. A. Wilson, Sarnia, R.R. 3.
7th " ..C. McConnell, Hull, Que.

### Onions.

1st Prize..F. F. Reeves, Humber Bay.
2nd " ..Chas. Aymer, Humber Bay.
3rd " ..Jno. Tizzard, Humber Bay.
4th " ..V. Robinette, Tecumseh.
5th " ..R. Coldrey, City View.
6th " ..I. A. Farquharson, Ottawa.
7th " ..Thos. Barwell, Fenwick.

### Celery.

1st Prize..A. Carlton, Lambton Mills.
2nd " ..J. Harris & Son, Belleville.
3rd " ..N. Sanderson, London, R.R. 7.
4th " ..W. Trott, London West.
5th " ..P. J. Jean, London, R.R. 8.
6th " ..F. F. Reeves, Humber Bay.
7th " ..P. A. Bell, Humber Bay.

### Potatoes.

1st Prize..W. E. Crandall, Ingersoll.
2nd " ..J. J. Davis, London, R.R. 7.
3rd " ..E. W. Grummett, Echo Place.
4th " ..Jas. Dandridge, Humber Bay.
5th " ..Henry Broughton, Sarnia.
6th " ..Cooke Bros., Cataraqui.
7th " ..Chris. Dent, Sarnia, R.R. 3.

## PRIZES AT THE CENTRAL CANADA, OTTAWA, 1914.

### Potatoes.

1st Prize..W. E. Crandall, Ingersoll.
2nd " ..J. J. Davis, London, R.R. 7.
3rd " ..Jared Moore, Sarnia, R.R. 1.
4th " ..Henry Broughton, Sarnia.
5th " ..Cooke Bros., Cataraqui.
6th " ..John Tizzard, Humber Bay.
7th " ..F. F. Reeves, Humber Bay.

### Onions.

1st Prize..F. F. Reeves, Humber Bay.
2nd " ..Chas. Aymer, Humber Bay.
3rd " ..H. Coldrey, City View.
4th " ..Geo. Reilly, Aylmer.
5th " ..W. E. Crandall, Ingersoll.
6th " ..I. A. Farquharson, Ottawa.
7th " ..John Tizzard, Humber Bay.

### Celery.

1st Prize..J. Harris & Son, Belleville.
2nd " ..A. Carlton, Lambton Mills.
3rd " ..P. J. Jean, London, R.R. 8.
4th " ..W. Trott, London West.
5th " ..N. Sanderson, London, R.R. 7.
6th " ..P. A. Bell, Humber Bay.
7th " ..F. F. Reeves, Humber Bay.

### Tomatoes.

1st Prize..W. Trick, Ottawa.
2nd " ..C. Aymer, Humber Bay.
3rd " ..Jas. Cox, Russell.
4th " ..C. H. Aymer, Jr., Humber Bay.
5th " ..D. Dempsey, Stratford.
6th " ..E. Hamilton, Dunnville, R.R. 5.
7th " ..I. A. Farquharson, Ottawa.

## PRIZE WINNERS AT THE WESTERN FAIR, LONDON, 1914.

### Celery.

1st Prize..A. Carlton, Lambton Mills.
2nd " ..N. Sanderson, London, R.R. 7.
3rd " ..W. R. Trott, London West.
4th " ..P. J. Jean, London, R.R. 6.
5th " ..F. F. Reeves, Humber Bay.

### Onions.

1st Prize..C. Aymer, Humber Bay.
2nd " ..F. F. Reeves, Humber Bay.
3rd " ..Chas. Buchner, Sarnia.
4th " ..W. E. Crandall, Ingersoll.
5th " ..John Tizzard, Humber Bay.

### Potatoes.

1st Prize..W. E. Crandall, Ingersoll.
2nd " ..Jared Moore, Sarnia, R.R. 1.
3rd " ..Geo. W. Bycroft, London, R.R 7.
4th " ..J. J. Davis, London, R.R. 7.
5th " ..Cooke Bros., Cataraqui.

### Tomatoes.

1st Prize..R. Dengate, Ealing, Box 52.
2nd " ..W. Trick, Echo Drive, Ottawa.
3rd " ..C. H. Aymer, Jr., Humber Bay.
4th " ..Jas. Cox, Ottawa.
5th " ..A. McGinnis, 80 Adelaide St., London, Ont.

# ANNUAL REPORT

OF THE

# Bee-Keepers' Association

OF THE

# PROVINCE OF ONTARIO

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1915.

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TORONTO

*To His Honour* JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

*Lieutenant Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Thirty-fifth Annual Report of the Ontario Bee-keepers' Association for 1914.

JAMES S. DUFF,

*Minister of Agriculture.*

DEPARTMENT OF AGRICULTURE,
TORONTO, 1915.

# Ontario Bee-keepers' Association.

## Officers for 1915.

*President*—J. L. Byer, Markham.
*1st Vice-President*—F. W. Krouse, Guelph.
*2nd Vice-President*—Jas. Armstrong, Selkirk, Rt. 1.
*Secretary-Treasurer*—Morley Pettit, O.A.C., Guelph.

*Directors*—District No. 1, R. E. L. Harkness, Iroquois; District No. 2, A. McTavish, Carleton Place; District No. 3, M. B. Holmes, Athens; District No. 4, R. Lowey, Woodrows; District No. 5, W. W. Webster, Little Britain; District No. 6, J. L. Byer, Markham; District No 7, F. W. Krouse, Guelph; District No. 8, Jas. Armstrong, Selkirk, Rt. 1; District No. 9, John Newton, Thamesford; District No. 10, Jacob Haberer, Zurich; District No. 11, C. E. Chrysler, Chatham, Rt. 5; District No. 12, Denis Nolan, Newton Robinson; Ontario Agricultural College, Morley Pettit, Guelph.

*Committees*:

*Revising Committee*—Mr. Sibbald, Mr. Pettit.
*Honey Crop Committee*—Mr. Couse, Mr. Craig, Mr. Sibbald.
*Representatives to Horticultural Exhibition*—Mr. Nolan, Mr. Couse, Mr. Grainger, Mr. Sibbald, and the Secretary.
*Transportation Committee*—J. D. Evans, the President and the Secretary.

*Representatives to Fair Boards*:

*Representative for Toronto Exhibition*—J. D. Evans, Islington.
*Representative for Ottawa Exhibition*—M. B. Holmes, Athens.
*Representative for London Exhibition*—E. T. Bainard, Lambeth.

## Treasurer's Report.

For the Year Ending October 31st, 1914.

| Receipts. | | Expenditures. | |
|---|---|---|---|
| Balance on hand, 1913 | $630 17 | Grants to Associations | $289 75 |
| Membership fees | 1,160 35 | Expenses Convention | 212 41 |
| Queen Order receipts | 1,623 77 | Expenses O.B.A. Committee | 83 93 |
| Affiliated Societies' dues | 125 00 | Subscriptions to *The Bee-keeper* | 960 31 |
| Ontario Government grant | 700 00 | Printing and postage | 358 68 |
| Honey sales, receipts (from last year's work) | 1,179 17 | Queen Order payments | 1,503 69 |
| Received for exhibition honey. | 1,121 47 | Office help | 64 80 |
| Interest on account in bank | 13 92 | Exhibition honey, expenditure. | 1,851 76 |
| | | Honey sales | 1,160 1' |
| | | Incidentals | 16 17 |
| | | Balance on hand | 52 16 |
| | $6,553 85 | | $6,553 85 |

Examined and found correct
this 7th day of November, 1914.
D. F. Cashman,
*Auditor.*

J. L. Byer,
*President.*
Morley Pettit,
*Secretary-Treasurer.*

# Ontario Bee-keepers' Association.

The thirty-fifth annual meeting of the Ontario Bee-keepers' Association was held in the Council Chamber, 57 Adelaide Street East, Toronto, on the 11th, 12th, and 13th November, 1914.

The President, Mr. J. L. Byer, occupied the Chair.

## PRESIDENT'S ADDRESS.

J. L. Byer, Markham.

In meeting together once more in our annual Convention we are reminded that, while time passes rapidly, and that on looking back the past year seems to have been very short, yet after all, many important changes have transpired as compared with conditions of a year ago. At that time nearly all bee-keepers reported a large crop, and in some cases anxiety was expressed as to the finding of a market for the same. Co-operation was a live topic, even if the large amount of time spent on the subject ended in nothing but "talk," aside from a few local efforts to start something on a small scale in the co-operative line. At that time the world was at peace, with the possible exception of the disturbance in Mexico, and no one indeed would have been so seemingly rash as to prophesy conditions as we find them to-day. To-day nearly all would report a very short crop—many would say a total failure. Instead of wondering how and where we will sell our honey, many of us have during the past few weeks been turning down orders with painful frequency. As all are aware, the most dreadful war in the history of the world is now in progress, and as we realize the blessings we are still privileged to enjoy in contrast with the stricken people of Belgium and Northern France, surely we should devoutly thank God that our lot has been cast in such pleasant places, and in a measure at least forget that we have had a failure in the honey crop.

As your president, quite properly you look for an account of my stewardship, and in this regard your servant feels that what little has been done on his part is not at all in proportion to the honor bestowed upon him by your electing him to such a responsible position as the president of your association. Frankly, little has been done personally, as the work of the Secretary seems to cover about all that is necessary, and aside from attending various meetings throughout the year and answering a great lot of correspondence, little credit for anything else can be claimed. When elected president of your association I promptly stated that I would endeavor to institute a more conservative policy in the matter of encouraging more people to go into the business of bee-keeping, and this course has been carried out in so far as in my power, even if meeting with severe criticisms in some quarters. I still adhere firmly to these convictions, and also know for a surety that the great majority of the men who depend upon bee-keeping for a living are like-minded with me on this question, and in my future career as a private in your ranks I shall do all in my power to help continue this policy. My position on this question has been made plain in the different journals, and it would be unwise for me to take up more time on this subject for the present.

Bees in general wintered well last winter, and in most cases were in fine condition for the honey flow that never came. In localities where buckwheat is grown or other fall honey plants thrive, enough nectar was gathered to put the bees in fine condition for winter, and in such localities the colonies have gone into winter quarters very strong in young bees, the clusters being very large in some apiaries I have been connected with. This should insure good wintering, other conditions being equal. Honey dew was reported in some localities, but I believe most of this came in early in the season and was used up before fall. As a consequence of the war, much difficulty was experienced by some in getting sugar, and in all cases it was necessary to pay a much higher price than usual to get this very necessary article, especially necessary to those who had a total failure of the honey crop and must needs get sugar or let the bees starve. An executive meeting was called, and after our Secretary had corresponded with the Dominion Government officials and had also got many bee-keepers to do likewise, the assurance was given that no bee-keeper should go without sugar who genuinely needed the same. In so far as I know, all were able to get sugar, although considerable inconvenience was experienced by some bee-keepers before it was obtained.

The failure of the honey crop also referred to, while working hardship in many cases, yet after all was not an unmixed evil. Many were unduly affected by the large crop of 1913 and seemingly believed that every season would duplicate the abnormal yield of that year. As a consequence beginners rushed into the business by the score, evidently seeing easy money in "a get-rich-quick" game. The supply business simply boomed and that end of the business can report progress for 1913, even if the bee-keepers report failure. With a full crop of honey in 1914 following the large yield of 1913 and some of that year's surplus carried over, taking into consideration as well the state of the money market at present, only one thing would have happened—honey would have been a drug on the market and prices affected for years to come. While many of these beginners, as well as the rest of us who depend upon bees for a living, have suffered temporarily, yet the failure will have the effect of teaching that there are two sides to the business of bee-keeping, and that failures are just as sure or surer as bumper crops. We who have been longer in the game learned the lesson earlier in life.

As to inspection, a subject of live interest to the bee-keepers, in so far as I have been able to learn, the work has been done as well as could be expected with the funds for disposal in that branch of the service. Year after year it is becoming harder to get qualified bee-keepers to do inspection work, and as a result much of the inspection has been done by students from the college at Guelph during late years. It is not my purpose to indulge in carping criticism, as I frankly confess that I see no solution to the problem—and, moreover, it is gratifying to note that during 1914 more experienced men were sent out than was the case in 1913. While most if not all of the students employed were efficient in so far as I know, yet the fact is quite apparent that the rank and file have not the same confidence in them as they have in men who have had a practical training for years in the apiary. More than that, I believe that Mr. Pettit is doing the best he can under the circumstances, and no doubt he would welcome any suggestions as to how the service might be improved. Some 21 inspectors were sent out during 1914, and over 1,300 apiaries were inspected. Of these over 500 were diseased. Fifty per cent. of the apiaries visited in E.F.B. districts were found diseased, while but 31 per cent. of those in A.F.B. apiaries were affected. Considering that in the latter case inspection was only made where disease was known or suspected, the percent-

age is not high and bears out the reports of the last few years that A.F.B. is gradually being cleaned up. On the contrary, as in last year's report as well, we have undeniable evidence that E.F.B. is rapidly spreading. Victoria County this year has a bad outbreak, and it seems certain that this disease will soon sweep all over the Province. In dealing with either of these diseases and considering the inspection problem, it is more in evidence than ever that every person contemplating keeping bees for pleasure or profit, or both, must surely learn to be his or her own inspector.

Fifty-five apiary demonstrations were carried on by the Department in various parts of the Province, and the same were well attended in nearly all cases. Over 1,800 attended all the meetings, and this number does not include the large meeting held at Mr. Sibbald's on May 24th. Although the honey crop was a failure and the fees from affiliated societies higher than last year, yet our membership has held its own remarkably well considering all the circumstances. Last year at this time it amounted to 1,404, now it is 1,284. This year again the Association put up a large and attractive exhibit at the National Exhibition, and judging from the comments of all who viewed the display it was of a nature that the Association had no need to be ashamed of. It seems too bad that some arrangements cannot be made with the authorities so that honey might be sold in unbroken packages, as the demand was constant and extensive every day of the exhibition. Arrangements were fully made for an exhibit at the Horticultural Show, when at the last moment the show was called off owing to the military authorities taking over all the large buildings at Exhibition Park. A glance at the programme will show that it is not nearly as crowded as in some former years—this will leave more time for discussion, questions, etc., giving an opportunity for all to take a real part in the convention—an opportunity which all are heartily invited to take advantage. In conclusion, I take this opportunity once more of thanking you for the honor bestowed upon myself, by electing me as your president a year ago, and while painfully aware of my inexperience and lack of ability in trying to fulfil the arduous duties of Chairman of your meeting, with the hearty co-operation of each and every one of you—something I feel assured of, I have not the least doubt but that we will have a profitable and pleasant time during the three days that we expect to spend together.

Mr. Krouse (Guelph): There are a few points I would like to touch upon slightly. The first is the short honey crop. We have all felt it more or less. I agree with the President that it has been a blessing, and, while it has been hard on the beginner, he or she has my sympathy, as I was once a beginner, and I was up against it good and hard for two or three seasons. I think that, too, was a blessing as it made me a better bee-keeper and taught me some things that perhaps if I had had a honey flow all the time I would not have learned. This season's light crop has left an outlet for the surplus honey of last season and the little there was this season, and it gives us a clean sheet. It will take two more good crops in season before it will affect the prices much. We ought to take courage and go on.

The second point is, being one of the executive, I feel my work this year has been very light, not very much to do, but there is no doubt in other years there is more for the executive to do than there was this season.

As to the third point I differ with the President a little bit. He said he was going to be conservative about encouraging more bee-keepers. I don't quite

agree with him there; I think there is room for more bee-keepers. I mean good bee-keepers, men that intend to make a business of it. I don't mean those that go in for pleasure or a hobby. It is like a child with a new toy for a little while, it amuses them a great deal, and by and by they get tired of it, and they throw it away in the corner and do not bother with it any more. That kind of bee-keeper, as soon as he gets tired of his bees, lets them go, and I think he is a nuisance to bee-keepers in general. On the other hand, the good bee-keeper goes along and produces honey. I think the honey will take care of itself. We have always found a place to sell at very good prices. We do not always have good years and these off years come along and give us a chance to get rid of our surplus honey and go on again.

## BEE-KEEPING EXPERIENCES.

Mr. Jas. Armstrong, Selkirk.

The President has touched upon the question of students as inspectors. That comes along my line; as most of you know, I have been out once in awhile doing a little work, and I had something to say along that line last year and I have something to say yet. I have often taken students out with me. They make a practice of sending out a student with some of the older inspectors. I don't know whether it is a good plan or not—whether the older ones are any better than the younger ones, but anyway they have done that and I have had quite a number with me, and I find I have had some "A1" students on the road with me. But I cannot but agree with the President that the older students seem to take better with the bee-keepers; they do not seem to place the same confidence in the younger men that came from the college. They say, that fellow is just out from the college, we don't take much stock in him. But I have had some A No. 1. I won't say anything about the others. I contend before a man is sent out on the road as inspector he should have a fairly good training at the college right in the yard, because there are a good many of these old bee-keepers, and some of the young ones too, who will give you pretty hard nuts to crack, and that is the trouble with the students sent out, they haven't had much practice along that line. The bee-keepers will ask them a number of questions and they can't answer them and then they lose confidence in them. I think they should have a thorough training before they go out, right in the yard at the college, the same as they have in any other branch, and then I think they would take a great deal better. They should be able to train inspectors there and put them in shape so that they would be fit to go into any man's yard.

Another thing I have had in my mind for some time, and that is, you all know we have had trouble in getting enough money to keep the inspectors out to clean up the foul brood question. The question is how to raise enough money to cover the ground. There are some here that believe every colony in the Province should be inspected, and I believe the same, and then we would know how we stand. The first few years I was out I was chasing round quite a lot of my time to find bee-keepers. There was no way to find them only when you got to a bee-keeper's place you would inquire where there were bee-keepers in that section, but when you get into a village, town or city you can't do that. Your next neighbor

may have been and you don't know it. Out in the country you can find all of them very easily, but in town you cannot, and that was one of the points we had up when we waited on the Minister of Agriculture last year, how to find out who had bees, and we advised having blank forms, etc., and they would be passed around by the assessors and filled up, and then all we had to do was to go to the clerk of the town or municipality and we could find exactly who had bees and where they lived. Then how to raise the means—we have tried nearly every year I think to get an increased grant. We have got an increased grant every year except this year, and I understand we have not got an increase this year for inspection. I am not sure about that, but I understand that is the case. I was saying last night, at the directors' meeting, that the committee would have to be changed, for we had got to the end of the string and we were not making any progress. My opinion is, and I think I stated it here two or three years ago, the only way we can ever get means enough to cover the ground is that the bee-keepers have got to help themselves and get all the help they can along other lines. I think if the Government finds the bee-keepers are pushing things and trying to help themselves they will get help, and what I would be in favor of would be to tax every man who keeps bees. It will hit me as well as the rest of them. I would put a certain tax upon every hive of bees in the Province, and that money would go towards cleaning up the disease, the same as the dog tax does for the killing of sheep, and I think that would be the proper way to get at it, and if we did that we would have money to cover the ground. Where I find the great trouble is, I am sent out and I go to John Smith's, he has got bees and they have the disease. I go there directly to his place and examine his yard and find he has got it. If I have the time I keep on circling around John Smith's territory till I get outside of where there is any disease, but very often before I get out to the outer edge I am called off the road. There is this fringe around this territory which I went around where there are a few hives which I have not had time to examine, and perhaps I won't get back there for two years, and when I come back there again the disease is pretty near back to John Smith's again. We should have enough means to go into each section where there is an inspector and keep on gradually from some centre and clean up the whole thing. I think finally the Government will have to try to get some man that is right up on the work to clean the yards up. You go to a man's yard and you will tell him and show him the disease and how to treat it, and you even go to work and treat a colony of bees to show how it is done, and the next time you go back you will see a big mistake, there is some thing he will let go, and the disease is back into the hive again; he wasn't particular enough to cover the ground thoroughly. Whereas if there were men sent out by the Government to do that in cases where we knew the men would not do a good job it would overcome that difficulty. I think when I go into a man's yard I can tell pretty nearly whether he will clean up the disease thoroughly or not after I am in the yard a short time talking with him, but there are a good many bee-keepers over the country that have a nice yard of bees but they have a farm or some other line of business which takes them away from the bees, and the chances are they don't see the inside of a hive for a whole year, they don't know what is going on, and if they attempted to clean up that yard they would do more harm than good. One of the inspectors and I were talking this morning about a yard, and we said when we got back to the man's place he went to work and melted all his combs up, but he melted them up right out in the yard and all the bees in the whole section, as far as bees would come, were helping him to clean up any honey that was there

around through the hives or in this wax or these old combs, and they carried it all over the country. He nearly destroyed all his own bees, but at the same time he spread it all over. In a case of that kind if there was a Government man to come along and clean them up it would be done thoroughly and you would not have to make a second trip there.

Then there is the demonstration question. Some think that it is not the right thing, but I think as far as the means go we can reach more that way than any other; that is, in the way of educating the beekeepers. There is one thing about it, we are called foul brood inspectors, but we are instructors as well as inspectors. We talk bees from the time we start out on the road till the time we get home, and that often away into the small hours of the morning. As soon as an inspector gets in a yard that is the very first thing he gets; he has got this and that question to answer, and that is where the students that are sent out are lacking, they can't answer those questions. I don't claim I can answer all the questions myself, but I think we can reach more that way than any other way. In all the demonstrations that I have had anything to do with this year I think the lowest attendance was in the neighborhood of about 30, and the highest in the neighborhood of 80 or 90. We reached all these people in one day. Very often we would go into a yard where there was disease, if there was honey coming in, and we would treat a colony right there, and all those people would see how it was done, whereas if we went to each man's yard it would take nearly a whole summer to do it.

J. D. 'Evans, Islington: I was greatly pleased with your President's address, I am thoroughly with you in the stand you take against the booming of beekeeping. I have taken that ground for a great many years and it was mercilessly set upon, but I am glad to find a great many of the best beekeepers are coming to my way of thinking. Beekeeping is a business by which some of us want to make an income, and I know of no other profession that tries to induce other people to go into the same business. You never hear a band of doctors when they meet announce that one of them got $100 for performing an operation and another got two or three hundred dollars for another operation, and it was a very profitable business, and young men should be induced to go into it. There has been a time when the very best honey sold here in Toronto at five cents a pound, and if we had another year like last year we would hardly be able to get five cents. It is no kindness to people to induce them to go into beekeeping. I never induce a man to go into beekeeping, because it is a very precarious business. I think we have a right to show the dark side of the case. I have found some of the students are good, first-class, and some of them are not. I called attention to the fact that a man in my neighborhood has discovered a case of foul brood, he had written to Guelph twice, he asked me to write and I wrote, and after awhile a student came from Guelph and this gentleman showed him the two hives that had foul brood. He examined one and found no foul brood in it, and he said, "Oh, your bees are all right, there is no foul brood in your hives." That was all he inspected. I have no doubt in the report it would show an apiary inspected and so many hives. Only one hive was inspected in that apiary. After some correspondence a student came this year and examined the same apiary and found nine cases of foul brood. I went with the directors to try to get some more money from the Province, but the Province is only paying $4,000 for inspection, and I think with Mr. Armstrong that the only proper way is to have an Act passed so that every hive in the Province will be

taxed and we will pay part of it ourselves. I brought that matter up two years ago and it was disposed of last year so I don't propose to bring it up again, but I think it is the only satisfactory way.

R. Lowey, Woodrows: I object to any further tax upon the country people. I don't know what you think, but I feel that I am in middle life and if I live as long as I have lived and the taxes increase as they have so far, I will have to move out. I must oppose my friend about making more beekeepers. My experience is that while two or three years ago there were bees all around me—everybody was getting them—now the nearest I know of is that within three miles there is a couple of hives of black bees. In bringing in beginners I encourage everybody who asks me. I say, "Of course there is money in it, go into it." The reason there are not so many around now I think is that they get into it and learn that it is a case of the survival of the fittest. Those who will make beekeepers will stick to it, and I think we should make beekeepers of any of them that keep bees.

M. B. Holmes, Athens: There are a number of matters that have been casually mentioned that I would like just for a moment to refer to. Now, in the matter of taxing bees, I suppose it would go without saying that if this association intimates to our lawmakers that we think we ought to be taxed there would be no manner of doubt but what we would get the tax and get it good. The lawmakers would conclude at once that for some reason we had concluded we were getting rich too fast and that there should be a special tax levied upon us. I would like to know first, sir, whether that plan has been followed in all the other walks of life, whether organizations ask to be specially taxed in their different walks?

Then again, in the matter of inducing people to keep bees, perhaps you will say before I get through, and I will agree with you, that for reasons very largely selfish I will admit I have not advocated that all keep bees. In what way is it selfish? Just in this way, that from quite a few years' experience I have known some of the varying fortunes of beekeepers, and knowing this, if I should induce numbers of my neighbors or fellows to enter the ranks with much or little experience and they should in the near future run against some of the reverses of which I have known, would they not, and might not very reasonably expect that they would visit summary punishment upon me personally for inducing them to go into the work which did not prove satisfactory. I would conclude if they didn't visit summary punishment upon me that they would perhaps feel like it, and that is rather an uncomfortable feeling.

W. A. Chrysler: I believe demonstrations properly carried out are a good thing, but demonstrations that are held merely for entertaining people that have an interest in bees are altogether wrong. It should be practical. I have seen in our bee journals descriptions of demonstrations held even by professors that were twenty years out of date in practice, that were used and explanations given which should have been relegated to oblivion as far as beekeeping instruction are concerned. We want those demonstrations given in a practical way, and so that they will be of some use and give some results, and they should be performed by practical men in a practical way.

There has been some reference made to foul brood inspection and students incapable of meeting the demands of their work. There is no doubt probably that they have not had the practical experience and the place for that practical experience has always been, in my mind, at Guelph. Foul brood should be sent

to Guelph and students instructed in the way of curing that foul brood, they then would have a knowledge of how to do that work which they are sent out to do.

## QUESTION DRAWER.

Conducted by H. G. Sibbald, Claude, Ont.

Q.—Is there a positive cure for European foul brood?

Mr. Lowey: I will say yes and no. I claim that Italianizing is practically a cure for it, although you may see a little of it while the colonies are weak in the spring.

Mr. Newton: What does Mr. Pettit say about it?

Morley Pettit, Guelph: No. From all the reports I have had, beekeepers are able to keep it down so that they have very little trouble, but I don't know of anyone who has got entirely rid of it.

Q.—How do you keep bees from swarming when producing comb honey?

Mr. Sibbald: The only plan that I know of is to requeen before the honey season. Give them a young queen and it is reasonably certain that they will go through a season without much swarming.

Q.—In Department Bulletin No. 218, Mr. Nash says: "Speaking of King-birds, I have never yet found honey bees annoyed, among the insects eaten by them." Is such your opinion?

Mr. Sibbald: I have an opinion that they eat bees and queens and drones. I have always had that opinion; perhaps I am wrong.

Mr. Lowey: I am very fond of birds but the king bird I believe lives on bees alone. I have shot lots of them and I have dissected their stomachs and I have found the stings, dozens of them, in their little gizzards and in their mouths. That is the sting of the worker bee. I have never yet found a drone. I have lost queens when they were quite thick around, but I was satisfied they were caught on the wing. I have also found them at the entrance to the hive. They would eat hundreds of bees.

Mr. Evans: I have heard that the bird only swallows the contents of the bee and immediately throws out the frame of the bee.

Mr. Pettit: Mr. Nash makes the statement that he has not found bees in the stomachs of king birds that he examined. Of course we have no means of denying that statement which he has made. It may be that he has not shot birds in the neighborhood of the apiaries where they would have a chance of catching bees, and there is a point that has to be remembered in connection with investigations of that kind. Occasionally scientists are investigating the insects that work on blossoms in an orchard and they catch so many bees and so many wild bees and they do not tell us whether there is a large apiary of tame bees in the neighborhood or not.

Mr. Holmes: I would like to add my own evidence along this line, and I presume it has been the evidence of many beekeepers. I have noticed time and again in reference to a pair of very nice king birds that while at work on a day when there is no wind or noise I have heard the dip of the birds as they flew across the yard and you could hear the smack; I didn't take the trouble to dissect the birds to ascertain whether they were destroying my bees; I knew they were, perhaps not with malice aforethought; they were just working out their destiny, that is all, but they did it just the same.

THE PRESIDENT: I am always loth to condemn the king bird too much, because it is one of the insectivorous birds we have, and while deploring the fact that our bird life is being depleted I am somewhat in a quandary just what action to take with the king bird. With regard to them catching worker bees there is no question about that. I have seen them in the home apiary along in the evening; you can see the laden bee coming in and I have seen the bird swoop down and catch them in front of me, and they invariably fly to some high place. I have examined quite a number and I have found a few stingers inside of the mouth, but I have never found a body entire enough to know it was a worker bee. I am inclined to think, with some ornithologists, that they fly to some high perch and then throw out the frame of the bee. If it was not for the danger that I sometimes feel in their catching queens I would be prepared to let them have what worker bees they get.

JACOB HABERER, Zurich: I have always been against shooting birds in my old home apiary. I never allowed the boys to shoot king birds or any other birds, but two years ago in our present home apiary we have a little bush nearby, and we have one apple tree right in the apiary, and we lost a large percentage of our young queens. We knew that we had the young queens there in our nuclei, but when we looked over the queens, whether they were laying or not, we missed about fifty per cent. of them. We knew we had a large number of king birds around the apiary and we found one nest in that apple tree, and so at last I said, "Boys, it is possible that the loss of our queens is due to the large number of king birds," and I told them to shoot all they could. I have noticed some of the birds quite often sitting on the fence or on the tree watching the bees and coming around and snatching them. I could not say whether it was worker bees or drones, but I noticed a number of times how they snatched the bees away. The result of shooting those king birds was that we had no trouble with losing any of our young queens. We got our young queens fertilized, but we lost about 50 per cent. of them before we shot the birds. Since then we have no objection to shooting them.

MR. ARMSTRONG: I have shot king birds and dissected them and found different parts of worker bees in them. I am satisfied that they destroyed them.

MR. SIBBALD: The evidence amongst beekeepers is that they are destructive to bees.

Q.—How do you regard the smoke introduction of queens?

MR. SIBBALD: I have not found it altogether satisfactory. I have lost some queens that way, and I have other plans that I have been using that seem to me more satisfactory.

W. W. WEBSTER, Little Britain: I tried that plan and found it worked all right, but like Mr. Sibbald I have a plan of my own that I prefer. However, the smoke plan introduces them safely.

MR. HABERER: I made up my mind this spring to test the introduction of queens with smoke because I fancied it would be a very fine plan for introducing queens in outyards. Mr. Millar and others said that it was a very fine thing for introducing a queen in a colony that has been queenless for a long time. Now, my experience in introducing a queen in a colony that has been queenless for a long time was that I had difficulty, but with a normal colony it worked fine. I was successful in nearly every instance where I took out a queen and killed her and introduced the other right away. I lost one off and on. In one outyard I took along eight queens and introduced them, but at the same time

I had a little robbing. That one was lost but the others were all right. We could hardly do our work properly without great trouble in working our bees on account of robbing and stinging, too, but I intend to practice that method for another year. I may say I have been as successful, or more so, with the smoke method than any other.

Mr. Holmes: My experience with the smoke method has been successful up to the point of 100 per cent., that perhaps looks all right, but when I tell you that my experience along the line has been limited to just barely one, that puts a different color on it.

Mr. Pettit: As many of you know, we sent out this method as one of the co-operative experiments and we had beekeepers trying the experiment all over Ontario. The conclusion I have come to from those results is that the average beekeeper is going to get about the same percentage of success with the smoke method as with the old cage method, not much more and not much less. Where it is successful time is saved. I was told by Mr. Davis from Tennessee at the St. Louis convention last winter that they had far better success with the starvation plan than they had with the smoke plan. The queen is put in a cage by herself with nothing to eat for 30 minutes and then is turned loose in the hive which is queenless and ready to accept a queen.

The President: I might agree with Mr. Holmes up to a certain point. I was successful to the extent of 100 per cent. I think I put in twenty or thirty queens. I wish to draw out this thought, there is nothing new about the smoke method, for thirty years ago my grandfather and dozens of others in Ontario were using the smoke plan, and they were using tobacco smoke, and I do not know yet if I wanted to be successful but what I would use a little tobacco. McKinnon sent me two queens, and asked me to test them out, and I gave them an extra smoking, and afterwards I found both queens dead outside of the hive. I think any beekeeper who has been uniformly successful in one method had better cling to that. Especially for beginners, do not forget that the time of year makes a wonderful difference in introducing queens. If there is any flow of honey around fruit bloom you can almost throw a queen at a colony and they will accept her. At the time of the honey dearth like we had in the majority of cases this year, it is a different matter altogether in introducing queens. I think the time I would take a chance of introducing would be about twelve hours after the colony has dequeened. I think from that time on the chances of successful introduction decrease instead of increasing. In the smoke method you will find it is not infallible; practically no method is that we know of. It is probably as uniformly successful as any method we have.

Mr. Sibbald: I suppose Mr. Holmes would approach a hive and give three or four puffs of smoke, is that the orthodox time, and then close the entrance for half an hour?

Mr. Pettit: Fifteen seconds.

Mr. Sibbald: I want to get at the plan for the convention generally. Is the plan fifteen minutes?

Mr. Byers: The plan is to get them in distress; it doesn't matter if it is a minute.

Mr. Sibbald: The next thing is to let the queen go in and say good-bye.

Mr. Pettit: Close the entrance for about fifteen minutes.

Mr. Sibbald: What about the size of the entrance?

MR. PETTIT: It is reduced to about an inch. Three big puffs of smoke, close for fifteen seconds, the queen goes in, close for ten or fifteen minutes, open; generally this is done in the evening.

MR. SIBBALD: When do you kill the queen?

MR. PETTIT: Any time during the day.

MR. HABERER: When you blow your smoke in take care where the wind is coming from. For instance the entrance is on the opposite side from the wind, it is most likely you won't get the smoke in the hive the same as if the wind is the same way and drawing right in the entrance; and if you have a low entrance, say only three-eighths of an inch you won't get the smoke in so well as if you have three-quarters of an inch. One should take a little precaution there.

MR. SIBBALD: It is important to get the smoke in; the important part is to get the smoke to every part of the hive.

MR. PRANCE: I have introduced quite a number of queens this last season. The way I do is I push cage and all in. I have the opening about the size of the cage and give them a smoking and close it for about fifteen seconds, then I push the cage in to about the centre of the hive. I tie a string on the end of the cage, then I close it up for ten minutes, and then I pull it out and the queen and everything is out of the cage. I have always found it successful.

Q.—How can a bee-keeper get a good crop in a year like this?

MR. NEWTON: Carry it over from the year previous.

MR. SIBBALD: The only plan I know of for a bee-keeper to get honey in a poor year is to keep his bees in good condition and to keep his pans as it were right side up and if there is anything comes he will get it. You haven't got any influence over flowers and atmosphere, and if there is no honey to be had you can't help it; you will have to try and live over till the next year and keep a stiff upper lip, and perhaps everything will be all right in the end.

MR. HABERER: I have never had my bees in better shape than this year for the honey crop, but I got no crop.

Q.—When introducing a queen, is it better to have eggs in the hive or have the hive free from eggs by leaving it queenless for four days? If the former case is the better, should eggs or young larvæ be given for requeening after the colony is queenless over one week?

MR. SIBBALD: I don't think it makes any difference as far as the eggs are concerned whether it is eggs or larvæ that are in the hive; if they have larvæ or eggs they can themselves produce a queen and in that state they are quite independent. I would class eggs the same as larvæ in that case. While in some cases it is easier to introduce a queen into a hive that has not any larvæ, still on account of them being queenless for some time it often happens that they are very stubborn and won't accept a queen. Take in the spring of the year, it is very easy to introduce a queen into a hive that hasn't any larvæ or eggs; they will accept a queen just with throwing her in the hive, and later on they might not; but I would say it would be better to introduce the queen before those four days have elapsed —not to keep the colony queenless four days but introduce about 24 hours after you have taken the other queen away.

MR. CHRYSLER: I might say it is dangerous to introduce a queen where there are queen cells in development in the hive. It might work in a good many cases, but it is not safe to introduce to a colony that has queen cells there or in the swarming period.

MR. SIBBALD: If you leave a colony queenless for four days they will have queen cells started, then it is unsafe to introduce a queen unless you destroy all the cells. If you can introduce a queen within 24 or 12 hours after the other queen is taken out you will get that queen introduced before they start queen cells and you will not have any trouble in looking through the hive in destroying the cells.

MR. ARMSTRONG: Why not wait?

MR. SIBBALD: I usually prepare the queen for introducing by leaving the cage in so that they can get at it very quickly. I would prefer the queen go in before the 24 hours; it might be that they get in before 12 hours.

MR. GALBRAITH: After you remove the original queen, how long does the colony remain before they become aware they are queenless?

MR. SIBBALD: I think some of them know in half an hour; I think they would all know in an hour. You notice they come out and run around the hive; they get excited and search.

MR. GALBRAITH: Isn't that the time to introduce your queen, when you find them on the search for the queen?

MR. SIBBALD: It might be if you can fool them to make them believe the one they are getting is their queen.

MR. SIBBALD: If the smoke method is accepted as the best plan, I don't see any reason why they might not be introduced in half an hour as Mr. Armstrong suggested.

MR. PETTIT: The principal objection I see to introducing queens by the smoke method during the day is the danger of robbing being caused. If there is any chance of robbing at all you put the colony in a demoralized condition by smoke and then they are liable to be attacked by robbers. But if it is done in the evening after robbing time is passed they have a chance to get collected before morning and be safe.

JACOB ALPAUGH, Innerkip: There seems to be no hard and fast rule for introducing queens. There is so much difference in the disposition of bees and even of queens. One queen will take fright when she goes among strange bees, while another queen will not. Then there are other bees that seem to be so cranky they won't accept anything, so that I have found really the best plan—I have tried smoke—and tried to put them in in cages that come in from the other side—the best plan I have found it to put them into a clean wire cage, the bare queens alone, and then insert that into the hive, either into the entrance or down in the frames, and when you find the bees looking for the queen you have just taken out, the moment you put that strange queen with them they will set up a fan, so that in a few minutes or half an hour after you have taken the queen out you will find the bees running up for the queen. That is the time to give the new queen, in my experience. I just shove in a clean wire cage and plug the end with candy, and shove it in when they are on the hunt for the queen. They will stay that way with that queen, and will not start queen cells, because they know that they have got a queen, and when she eats out the candy she is almost invariably accepted. If a queen takes fright that is what plays havoc and they will jump on her. I got two dozen queens two years ago from the other side and I introduced every one of them. When you are buying queens you don't like to lose any of them and I find that is the best plan to introduce your queen. I don't open the hive for from two to four days afterwards.

MR. KROUSE: In one case with me while it was with success, it started rob-

bing. The bees started up a roaring noise, and the bees near there went to work and started to rob, and they robbed out the colony of the honey; but the queen was still there with a few bees around her. I did that towards evening, but that same evening I introduced five or six queens the way I have usually been doing it. I kill the queen in the morning when I first go to my yard and I work there till night, and if I do not I wait till night and then let the queen run in on the front, but I take good care I do not touch the hive in any way to disturb it. I have a little stick, and if she runs to one side or the other I put it down and guide her till she goes in the entrance. I have introduced sixty queens that way and have not lost one; that was to strong, powerful colonies. I would make that point, don't meddle with your bees after you have let your queen go in. I recommended that to one man who put the queen in, but the next day he wanted to see if she was all right, and they balled her right in front of him and killed her.

Mr. Newton: I think that is a most important point which Mr. Alpaugh has brought out. So many people are so anxious to see whether she is safely introduced that there are more queens killed after she is safely introduced than before that, because they will not leave the hive long enough till she is all right.

Mr. Sibbald: The question Mr. Chrysler asked wasn't exactly how to find a queen in robbing time, but that is a pretty good question. Does anybody know a good plan to find a good queen when the robbing season is on? It would be worth something to know it.

Mr. Webster: Look into the hive in the morning or evening.

Mr. Newton: I think the best way is always to use your bee tent. I do not think any hive should be opened without the use of the bee tent, and for that reason you don't need to give them much smoke and you do not demoralize your hive and you are always sure you will succeed in that hive. I often think the same in the foul brood inspection: I know tents are a little cumbersome to carry around, but I think it should be all done under the tent.

Mr. Armstrong: My method of finding a queen is to give them a little smoke in the entrance, but we find in opening the hive the queen will go down to the bottom and go around the far side and get off the combs altogether, and to avoid that I open my hive generally on the side next me. I take out one comb. I just slip my combs over as quickly as possible and take out one or two on the opposite side, and that stops the queen from going up on the side of the hive, and nearly every time I have got my queen on my comb.

Q.—Is it advisable to give a comb with eggs or larvæ in a hive with an unfertilized queen?

Mr. Sibbald: I would say it is not advisable to do that. An unfertilized queen is regarded as not ready to lay, and the bees seem to think there might be some accident before she does lay, and they will raise cells to provide against possible failure of that queen developing, and of course you will have then to guard against an after swarm, or she may develop and start to lay, and then you will be surprised to see a swarm caused by the eggs or larvæ developing—drawn cells on the larvæ and eggs you have given.

Mr. Haberer: What is the reason they are killing off the virgin in this case?

Mr. Sibbald: Do you think if she was properly introduced before the comb was put in that she would? I never found that the case.

Mr. Haberer: Years ago it was very often claimed in the bee journals that if you put in comb with eggs or young larvæ they are very apt to kill the virgin queen, and I have a little idea that they will do that some time, but I am not sure

of it yet. I thought, perhaps, some one had a better idea. If the queen does not lay for quite awhile, and we would like to be sure about whether she is there or not, it always takes some time to look for a virgin. The best plan simply would be to put in a comb with larvæ or eggs in case she is not there and it would very soon show if she is not there, because they would start cells if the virgin was lost. But in case it should be possible on account of having eggs and larvæ right at once that they should kill off the virgin it would not be advisable to give a comb with eggs or larvæ. I am not sure of that, and I would like to be sure of it.

Mr. Sibbald: The only thing is the possibility that it may cause a swarm. They might have a virgin queen in a hive and still draw cells, taking the precaution against possibly losing that queen before she is laying; and I would say it is not advisable to give them, but you have another idea that is all right. If you want to find out if there is a virgin queen in a hive give them a comb with eggs and larvæ in. If there is not a queen there they will start to draw cells and that will show you; but they are apt to draw some any way; they may draw, but not always. If I take off a super and find a number of hives without laying queens I just take a comb with larvæ in or eggs and cut it up into little pieces, and just under the quilt put a piece of comb and leave it there, and in a week's time get hold of that little piece and turn it up, and if there are cells started there generally the hive is queenless and you will find a good many of them laying in it all right. That might happen just in the middle of the season. They might be apt to draw cells for protection or preparing to swarm even with a virgin queen in the hive.

Mr. Pettit: I have had this experience when we used to allow natural swarming in the parent hive, but the time we would expect the young queens to be laying we would always look them over to see whether the young queens were all right; we would look in a hive to-day and find a little patch of eggs, indicating the young queen had started to lay; look in that hive to-morrow and those eggs would be gone, there would be no eggs there at all, and we always said, "Well, they ate the eggs." And if a comb containing young brood is placed in a hive like that it seems to encourage them in some way so that the laying of the young queen goes on and our young brood goes on developing. We always practise that where we wait a reasonable time, and do not find that there is a young queen laying; we would put in a comb containing eggs and young brood and then look a little later, and if we found no cells and found eggs at that time of course we knew everything was all right.

Mr. Newton: The only trouble is what Mr. Pettit has just been speaking about. We used to practise the same method years ago, but when there got to be so much foul brood in the country the interchanging of combs we thought was not a good idea. It is all right for the practical beekeeper, but when it comes to lots of men who do not understand foul brood and do not look after the interchanging of combs it isn't a very good idea. It is all right in a sense, but if you don't understand the interchanging it is a very bad thing; it is one of the finest things to spread foul brood over an apiary that there can be.

## ADDRESS.

W. B. Roadhouse, Deputy Minister of Agriculture, Toronto.

I can assure you it gives me very much pleasure indeed to be with you this afternoon, at one session of your annual gathering. When a few weeks ago your Secretary kindly extended to me an invitation to be with you I took advantage of the option of making a speech or presiding at one of the sessions, and as a choice between those alternatives I had no hesitation in determining to accept the honour of presiding at one of the sessions of your gathering. I did so because I felt it relieved me to a very large degree at least of the responsibility of making a speech, and at the same time it afforded me the pleasure of being with you for one entire session, of listening to the other addresses, and perhaps also of listening to the discussions that might follow some of the addresses this afternoon.

As your President has said, on more than one occasion representatives of the Bee-keepers' Association have visited the Minister of Agriculture at his office at the Parliament Buildings, and that being so, it is only one of the rudimentary rules of society that members of the department should from time to time pay you a return visit. It is my pleasure this afternoon to pay that return visit, and perhaps that differs somewhat from the visits which we receive, inasmuch as I am not asking for anything. However, I do not wish to indicate that you are any the less welcome at any time you desire to visit any officers of the Department because from time to time you may want something. In the very nature of things in a country like this and in an industry which is always expanding and developing the demands are bound to change or to increase, and it is a source of satisfaction to us to be kept posted with first hand information as to the development and the needs of your organization and the industry which you represent.

This afternoon, as I intimated, it is not my intention to prolong my remarks to undue length. It does appear to me, however, that it would not be out of place to refer to the fact that you are meeting this year under very peculiar and unparalleled circumstances, and under circumstances which I am sure we all sincerely trust will not be duplicated in the years that are to come. Only a few months ago we were all engaged in pursuing the peaceful routine of our regular avocations, when across the peaceful fabric of our dreams there came the grim spectre of war, and since then its devastating hand has been abroad in many parts of the world and in every part of the world has its influence been felt. There is possibly no country, whether belligerent or neutral, which has not felt the influence more or less direct of the great conflict which is now in progress and which is taking up so much of the energies of all the countries a party thereto. It is not my intention this afternoon to discuss the causes or the consequences of that conflict, but I might just note in passing its relationship to the industry which you represent and allied industries to yours. I have said that every industry has felt its influence. It is perhaps a case in which we can congratulate ourselves that this country is so fortunately situated, for while we are at war in common with other parts of the Empire, and while it is our duty to do our part, and I believe as a country we are doing our part, it is none the less true that we are not in the war, we are not in the theatre of war, and while from other countries there comes the grim and terrible stories of devastation, while their homes are ravished, while their fertile lands are laid bare, while their people are driven from their occupations and from their homes, we are permitted for the

most part to go about our daily avocation, to enjoy the security of our homes and to make our plans for the future. That, I think, is something on which we should congratulate ourselves, and out of our gratitude for that good fortune do our part in making for the ultimate success of this engagement.

This brings me to the question of the relationship of this matter to the industry which you represent, and to the broad general industry of agriculture. It is perhaps true that there is no industry affected detrimentally to such a small degree as the industry of agriculture. The importance of food-stuffs is a subject about which we have heard a great deal during the past few months, and I do not think we have heard too much. While perhaps emphasis has been laid upon the necessity of an increase in some of the more stable lines such as wheat, I am sure that is because it is fundamental. We must have bread, but nevertheless, no doubt, it is equally true that we might look forward to a big demand from this country of food-stuffs of all kinds, including the industry which you represent, the honey industry. There will be, I take it, a demand for various lines inasmuch as the conflict has interrupted the regular lines of production in countries which are more immediately engaged. That being the case, it behooves us to make our plans for the future, and to proceed along the lines that seem to be best calculated to make for our own individual prosperity and make for the greatest safety of the Empire to which we are so fortunately attached, in the matter of the supply of the essentials of life. It may be said by way of illustration that when a young man enters upon any avocation in life, when a man takes up any occupation or business, he plans for normal conditions. Before he has proceeded very long perhaps he runs into abnormal conditions; sickness or misfortune may overtake him, and accordingly his plans are disarranged. What that is in the life of the individual the war is in the life of the nation. But, just as the individual must rearrange his plans, must not be discouraged because of his misfortunes, so I think we, as a nation, should rearrange our plans and plan to go ahead on the basis which we believe will be the basis for permanent enduring existence. After all, in the course of time, let us hope it will be a brief time, this condition will pass away and we will be again upon normal lines. When that time comes it seems to me that this country of all countries will be in a position to go ahead more rapidly than it ever has in the past. I predict for Canada and for the Province of Ontario still greater development and still greater prosperity when this conflict is happily terminated; and I think it behooves us to be in a position to do our part and to contribute to that end. To do that we must be efficient. Efficiency is the big demand of the present day, no matter in what line it may be; and in that connection I am glad that you are holding your convention and that you are going ahead with your various plans to place at the disposal of your members the opportunities which will give them the chance to so equip themselves as to discharge their duties in the most efficient manner, and consequently in the manner which will inure to the greatest prosperity to themselves. In carrying on that work I am happy to be able to assure you that you will still have the hearty co-operation of the Department which I have the honour to represent, and it will be our purpose to endeavour to aid you in every way that you may place at the disposal of your members and the others engaged in this industry those opportunities of training and development and education which will make them more capable bee-keepers, more capable agriculturists, more capable in whatever line of work they may be engaged, so that they may realize the best for themselves and for their Province. Then, therefore, in this confidence, in this unfailing courage,

let us look forward to the day of ultimate victory for our principles in the conflict in which we are engaged. Let us be prepared when that day comes to discharge our duties more capably and more efficiently than ever in the past. In that confidence and in that hope I commend to you the programme for this afternoon and wish you success, not only to-day, but in the future days of this gathering.

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## THE ADVANTAGES AND DISADVANTAGES OF SPECIALIZING IN BEE-KEEPING.

W. A. Chrysler, Chatham.

The subject of this paper is the choosing of the executive committee, and was given me to express my opinion as to whether a person should engage himself entirely in bee-keeping, or to engage in it in connection with some other line of work.

The route, by which I might say all, or nearly all bee-keepers came to the "specialty" stage, has been in connection with some other business, and became specialists as knowledge and faith in the success of the business developed.

Bee-keeping, being such an interesting occupation that those engaged in other pursuits, who have certain portions of their time to spare, engage in it in a small way, and find it healthful, interesting, and instructive, and a change and rest from the monotony of their occupation. Where profits are not of vital importance to all such, there may be an advantage to the person engaging in bee-keeping as a side-line.

The advantages of specializing in bee-keeping are the disadvantages of not specializing. The specialist in bee-keeping signifies that a person is engaged to the full extent in bee-keeping. Therefore a specialist in bee-keeping signifies all that the word bee-keeper could convey. We can, therefore, conclude that if there are no advantages in bee-keeping, and there are disadvantages in bee-keeping, then bee-keeping should cease as an occupation.

The time spent, the education, and the necessary appliances needed to become a successful bee-keeper are too great to have that time, thought, study, and managements divided with other pursuits.

In my own experience, which dates back probably thirty years, a greater part of that time bee-keeping was a side line. I considered myself successful in good seasons, and when poor seasons (which are not very poor) came, I considered that, when labor and expense were counted, there was a loss.

I had faith, that with more time devoted to bee-keeping, and a capability of handling enough bees to produce enough honey to make a living in the poorest season I had experienced, I could then afford to let bee-keeping be my main business. I had a pretty fair knowledge of bee-keeping, but to handle enough bees to make a specialty I had much to learn and do.

To those who keep bees in a small way, and who contemplate specializing in bee-keeping, that, from my experience, your test will come when you have embarked entensively enough in the business, that you get well behind with your work, and cannot keep up. Don't get anyone to help you out of your difficulty. It will spoil you, and you will not learn anything. Go at it alone, even if your bees are bombarding you with swarms, and all seem to have the same notion at the

same time, or any other apparently unsurmountable task. You have one of the grandest opportunities of exercising your intellect, and may require the exercise of all of it, but sooner or later you win a knowledge of some part of bee-keeping that you will value, and form a system of saving time and labor. There is a saying that will apply here, and it is this: "The place to swim is when you are in the water"; also one quoted by the late W. Z. Hutchinson: "That persistent people begin their success where others end in failure.

The standing of our apicultural knowledge is the result of practical work conveyed from the specialist, through the medium of books and bee journals and coming in contact with fellow bee-keepers at conventions. New ideas form an inspiration, and when put to a practical test lead to the forming of a structure of facts, or are rejected from the mind as an expense to further thought.

It is a regrettable fact that many specialists are in possession of advanced methods and knowledge, that are not conveyed to others or are not published, and even if published, should the writer be not well known, are little noticed, and are soon forgotten. A farmer cannot go to the city post office or store, or even look over his line fence, without observing the methods of others in his own business.

Bee-keeping is altogether different, and resembles more the occupation of a physician, a lawyer, or a business man, who strives to enlarge his practise or his business to the greatest extent possible, and by that means acquire success.

Should anyone of them combine the occupations of the other, failure would most surely result. Occupation for every month in the year is possible when specializing in bee-keeping, putting the honey in retail packages should be done by the bee-keeper and sold to the consumer and to the retail trade; preparing supplies and planning for next seasons, is an occupation well fitted for the winter months.

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## DISADVANTAGES OF SPECIALIZING IN BEE-KEEPING.

F. W. Krouse, Guelph.

It is much easier to speak on this subject this year than it would have been a year ago, as the seasons have been so different for producing honey. Last season was all right for the man that made bee-keeping a specialty, as there was plenty of work and a good revenue for his labor. But this season was quite different, as there wasn't so much to do with the bees and nothing gained financially. When you have something else to fall back on a year like the present one it comes in very convenient to help pay your bills. If you live near a town there are three things you can work in with bees very well, that is, fruit, vegetables, and poultry. I have tried small fruit such as strawberries and raspberries, but had to quit them as they interfered with the bee work too much, so in fruit I have cherries and black currants; in vegetables I grow asparagus, potatoes and onions. These I find do not interfere with your bee work very much. The asparagus starts about the 10th of May, and is done by the 1st of July, and the work is mostly done in the morning. The onions do not cause very much work if you have your ground in good condition. The potatoes I grow for selling for seed and they do not cause much trouble as the work comes in spring and fall. I have ten acres of land divided as follows: 2½ acres in asparagus, cherries and black currants; 7½ acres is divided into two lots, one five acres and one two and a half. This land I

used for potatoes in this way. I take one of these lots and sow it to oats and seed it down, and the next year I plough down the clover and plant it to potatoes. The other one is sowed to oats and seeded down. This way of working my land saves me buying fertilizer. It seems to give good results, but I have not had much experience in this method as yet. The man who specializes in bees will necessarily have a lot of expense connected with his bees. He will have honey pails and foundation, hives and a lot of other expenses too numerous to mention. These bills are often very large. If the honey crop is a failure the man specializing in bees will find himself in a bad position, not only will the man not have any honey to sell to pay his bills, but the bees will often not have enough for themselves and he will have to feed them to carry them through till the next season. The sugar necessary for this feeding runs into quite a large bill, as many of you know this season. The man going in for bees and bees alone should have enough money before he starts to carry him over one or two failures. That is where it comes in handy to have your eggs in more than one basket, when you have money coming in from these other things to help pay the bills for your bees.

Mr. Anguish, Lambeth: You have taken your card down then for selling half your property?

Mr. Krouse: Not necessarily. I think yet I have too much land, but last year I did feel like specializing; the work was pretty heavy; but this year it was quite different.

Mr. Anguish: I noticed last year when I was at your place you were very keen to sell part of your property.

Mr. Krouse: Well, it is for sale yet.

Wm. Couse, Streetsville: Not being what you might call a specialist in the sense of Mr. Chrysler, it would be very hard indeed to call myself a specialist. I suppose most people think because I have been in the bee business for so long that I am a specialist. I don't usually keep more than 150, sometimes up to 200 colonies. Then I have other things; I have the coal business and I buy grain and seed, so therefore I am an admixture. The reason I am that is that formerly I used to run 150 to 200 hives of bees and I thought I hadn't enough to do in the winter time, and I didn't have. I got through in the fall. When I first started and I was really through with my own I was fortunate enough to get away to Muskoka to hunt for a month at a time. I wish I had kept on like that. I have got into so many things I haven't any time; I have practically got to be too busy and I don't know that the thing equals itself up very well. I didn't think I dare risk myself on bees alone at that time so I went into other things. While I was fairly successful, when it came to winter I had no crop of honey, the first year I came to Streetsville: it was just as bad a year as this. I had somewhere in the neighborhood of 100 hives of bees and I think it was 300 pounds of honey. Then I had to be a specialist in something else to make a living. The facts were out of that 300 pounds of honey—I suppose it was sold for 18 cents a pound, which gave me $56—I had $25 for my summer's work. I went and worked out for the winter. That gave me a feeling that it would be wise to take in something else for the fear that a few years like that would starve me right out. I did so, and in this length of time, 35 years, there have been seven years without anything, worse than nothing; it seems to come around that on an average about every seven years a beekeeper will have nothing, but in those years I have learned that if one makes well in one year it is wise to save for the next year, for you don't know what it will be.

I know that beekeepers who are making a specialty of beekeeping are successful, we admit that. The average one is just about as successful as I am by taking up these other things, and I think one can become more expert in any one thing if you can give your whole attention to that one thing. That is a certainty. We are perhaps given rather much in this country to dividing ourselves up into several different branches and it is coming to the time when it seems almost necessary to be a specialist to accomplish the greatest out of many given things. Therefore I have no fault to find with specialists. It is pretty hard for a man when he has been in business like I have for that length of time to change. The average man does not change much when he gets over forty years of age; he keeps on doing the things he has done. Young fellows can become specialists more readily than a man who is older. Mr. Krouse, however, seems to be of the opinion that he is just as safe the way he is, and he is pretty safe, too. It all depends on a man's location, his ability, and everything else. I like business very well, I am rather fond of it; I am rather fond of beekeeping, but my experience has been I have been pretty safe because I have always had something coming in. I have got a coal business that brings me in something every day of the year. Previously I have seen it when I was $200 in the hole through bees, but I am selling something every day, and am not going back but getting ahead a little, so that it rather convinces one that it is safe.

Mr. Byer: I was impressed with one thing Mr. Couse said: he was very fond of business and liked beekeeping. Beekeeping is hardly considered a business: it doesn't require very much brains to keep bees; that accounts for the number being in the business and being specialists. I am a specialist in that it is about the only way I have of making a living; I am in that position because I have not any land, and I did not have any money to start with, and I did not know what else to do. I started out with a few bees. I want to say quite frankly I have my doubts to-day whether it is a safe thing after all, especially for the younger men starting out. I am of the opinion that men in the position of Mr. Couse and Mr. Krouse are in the safest position. I have come to the conclusion during the last five or six years. This year I bought two acres of land, and I am going to try and raise enough potatoes for next year. It is very well in years of flush crops to boom the business, and think everything is going swimmingly well; but I want to state that when we have a full crop, if we have much garden crop which comes in as much out of season as possible to interfere with beekeeping interests it is a very difficult matter to attend to the work. I don't know how we would have done it last year if we had had very much garden stuff or fruit to attend to. There were about three months that we were going at the rate of about sixteen hours a day, and I do not know how we could have got any work done if we had had other work to attend to. But on the other hand in a year like this a man who has a garden, or, like Mr. Couse, has coal or seed or grain business, he has something assured. We have about 300 colonies in York County and there is always some work to do whether we get a crop or not, and from those colonies we have had about 2,000 pounds of dark honey—buckwheat honey, at seven cents a pound, f.o.b. and I fed 2,500 pounds of sugar. On our yards up north fortunately we got a little which has helped things out. But, depending on bees alone in starting out you are taking a chance. I am very thankful that in the past luck was with us. It is a risky thing for the young man to start out putting his all in bees and bees alone. He may get through and may not. Two or three years in succession like we have

had this year would put a man on his back unless he was pretty well heeled financially. Then we have other things, we have European foul brood. I think when that disease does strike us it will put us temporarily out of business. It is within forty miles of us now. Taking all things into consideration I would unhesitatingly recommend to the young men going into business to go slow and combine his business with something else until he had worked it out as an assured fact he can make it go in itself. I am not prepared to say how many bees a man should keep, as we know from experience seasons are variable. I am strongly inclined to agree with friends Krouse and Couse that a man is safer if he has more than one iron in the fire, especially in a year like 1914.

Jno. A. Lunn, Fingal: I am not a specialist in bees, not yet. I have been considering the advisability of becoming a specialist. It seems to me that a man who devotes his whole time to specializing in any business, if he goes at it conscientiously and does the work properly, is going to be successful. It may be a mistake to go into beekeeping as a specialty if a man has nothing to fall back on, and if he knew if he had a failure for a year or two it would put him on his back; still, if a man has once got the experience I do not see why it could not be carried through successfully as well as any other business. It would be foolish, of course, for a young man to go into beekeeping as a specialist if he did not have the experience. You take and devote your time between bees, as I have done, and a 100 acre farm, and try to do the work pretty much alone, and you are going to neglect both. That has been my experience; and though we have nothing particularly to kick about in a year like this—we may not possibly more than pay expenses—while we have had a poor year, a year like last would more than carry us over a year like this, if a man is a specialist. I do not know just exactly how much per colony a man would expect to make if he had a first class year, but I might say for the last few years in our own county I suppose I have averaged clear above expenses about $10 a colony. If a man had 500 colonies and he had a good year, say once out of three years, if it were just $10 per colony over and above expenses in an ordinary year, and the other one a poor one, it seems to me he would not be able to live, and of course if we look upon money as being the whole aim, possibly that might change things, but it always seems to me that money in the bee business was the smallest part of the concern. I know it is necessary, but still at the same time the business itself is worth considerable, and for that reason I would rather be a specialist in the bee business than have bees as a sideline.

R. E. L. Harkness, Iroquois: I must say I am not a specialist in the beekeeping business, and further I am not going to become a specialist. In the year 1901 my father had a few colonies of bees kept in a rather slipshod manner, and I was a young lad running around just in my teens or pretty nearly, and he said to me one day he wished I would take over those bees, and that if I would not he would dispose of them. I took them over, and I might say that in six years I built up that apiary so that at the sixth year I had a crop of honey that netted me about a thousand dollars. At the same time I was taking a good share of the farm work. A little later on as time advanced my older brothers went off by themselves, and I found myself with the farm and my bees and the whole responsibility rested on me. I still continued at my bees, and I took up the other work. The other work was growing fruits, apples, strawberries and general farm work and farm dairying. Now, the great objection that people will put up is as to the labor problem. To my fancy it is just the one way we are going

to overcome this difficulty. Very true it requires labor, but as I say this is the one way we are going to overcome the difficulty, employ labor and make our men comfortable. The old rule among farmers is that they will hire a man for seven or eight months and for the balance of the season he is turned as it were out to pasture. Under those conditions we are never going to get labor, we cannot do it; but by going into these side lines we will overcome this difficulty very greatly. It leaves us free so that we can take charge of the entire farm, and we can devote our time to these side lines. A man can go out and can plow as much ground in a day as I can; he can hoe as many potatoes in a day as I can, he can do as much cultivating. Why not confine yourself to work that you enjoy possibly more than that, and at the same time you are giving labor. This year I ran about an acre and a half of strawberries. I had a revenue from that at about the rate of $900 an acre, and with very little labor I looked after that strawberry patch. We produced a crop of apples on that farm this year that ran up about eight or nine hundred barrels. I did a large share of the work of looking after that orchard; I mean the pruning and spraying was looked after almost entirely by myself—of course with my assistants. In my bee-keeping this year I had a small average of about 27 or 28 pounds. These eastern men were not as fortunate as the western men. We had a light crop. It was only in the neighborhood of 40 pounds. Had I been specializing in bee-keeping alone what money would I have made last year and this year over and above expenses? And as it has been and as I have been operating, I find at the end of the season I am well repaid for my season's work, where otherwise I would consider I would have little or nothing.

Mr. Holmes: The situation and the discussion so far seems a bit peculiar. It will be remembered that a short twelve months ago the situation was rather different. At that time the question was not so much along the line as this afternoon, as what shall we do? And I believe I endeavored to point out then what I regarded as an inconsistency, if the word will fit in there, in the seeming uneasiness on the part of producers owing to the fact that they had a heavy crop, and I also pointed out as well as I knew how that in other lines it is not so, the merchant being only content when he had a stock sufficient to meet the demands for some little time. Twelve months has elapsed and to-day we do not know whether to specialize in bee-keeping or not. I maintain that the prospect is good and that the extraordinary conditions obtaining at this time owing to the war and other conditions will right themselves, and that the bee-keeping industry is as good as ever, even though it did fail this year. The climatic conditions prevailing during the time when they should have been piling up the honey for us were such that they could not do the work. No fault then to them. And let us not fall into the rut of thinking that because they fail once in awhile they are no good. Some one has said, and rightly, that a rut is a grave with both ends picked out. Let us keep out of the rut. What is failure anyway? The honey crop failed this year, true. Some one has asked me since I entered this room, "Holmes, did you have a crop sufficient to make you smile this year?" And I said, "Yes, just about that size."

## REPORT ON APIARY INSPECTION AND DEMONSTRATION IN ONTARIO, 1914.

Morley Pettit, Provincial Apiarist, O.A.C., Guelph.

It has not been found necessary to make much change in the management of the inspection of apiaries from the methods reported at previous Conventions. In accordance with a resolution passed at the last Annual Convention, more local inspectors were appointed than ever before, but with this exception the work has been carried on much as usual.

The Inspectors' Conference was held at the Bee-keeping Short Course in January at the Ontario Agricultural College. A letter warning against danger of spreading disease by allowing bees to rob was sent to the general list of bee-keepers early in the spring, and the self inspection report forms went to the disease list of bee-keepers in May. These were given a hearty response by the recipients.

Twenty-one apiary inspectors were employed, as follows: James Armstrong, Rt. 1, Selkirk; Chas. Blake, Snow Road; Joel Barlow, Delta; Alf. Denison, Pana; Herbert Daugherty, Long Bay; Jas. H. McCauley, Brampton; Jno. A. McKinnon, St. Eugene; Jno. S. Schrank, Port Elgin; Warrington Scott, Wooler. These nine men were strictly local inspectors; that is, they are practical bee-keepers appointed to inspect bees in their own and adjoining counties.

Wm. B. Angle, Fenwick; J. C. Duff, Markdale; Ralph C. Fretz, Forest; Eric Hutchinson, Mount Forest; Neil Robertson, Northwood; Harley H. Selwyn, Ottawa; Wm. A. Weir, Toronto; Jno. T. Wilson, Petrolea. These eight men have taken some training at the Ontario Agricultural College and have returned to their homes to keep bees. They also acted as local inspectors.

The remaining four men, Wm. Agar, Eric Atkins, J. L. Dougherty and Stanley A. Stewart, were sent out directly from the Ontario Agricultural College, after having received a special course of training in apiary inspection and in conducting apiary demonstrations.

As the money voted for apiary inspection and demonstration was the same as last year and the number of inspectors was increased, the time each one could be allowed to devote to the work was very short. Unfortunately some of the local men did not start inspecting at the beginning of the season. This cut their time shorter still and their counties were neglected accordingly. It is to be hoped that they will make an extra effort to get an early start in 1915, as every bee-keeper realizes the importance of having diseased colonies located early in the season so that treating can be done in time for bees to build comb.

The two following schedules show the work done in the various counties: For the sake of comparison the districts infected by the two different diseases are reported separately.

APIARY INSPECTION IN E. F. B. DISTRICT.

| County. | No. visits to Apiaries. | No. Apiaries found diseased. E.F.B. | No. Colonies found diseased. | Total No. Colonies in diseased Apiaries. |
|---|---|---|---|---|
| Carleton | 169 | 90 | 518 | 880 |
| Dundas | 3 | 1 | 1 | 3 |
| Durham | 27 | 12 | 121 | 285 |
| Frontenac | 17 | 6 | 36 | 311 |
| Glengarry | 11 | 0 | 0 | 0 |
| Grenville | 7 | 0 | 0 | 0 |
| Hastings | 13 | 11 | 23 | 256 |
| Lanark | 47 | 14 | 100 | 136 |
| Lennox | 9 | 5 | 24 | 182 |
| Lincoln (Grantham and Louth Tps.) | 2 | 2 | 16 | 55 |
| Northumberland | 69 | 54 | 160 | 958 |
| Peterboro | 2 | 1 | 80 | 80 |
| Prescott | 63 | 8 | 36 | 145 |
| Prince Edward | 33 | 25 | 91 | 307 |
| Renfrew | 37 | 28 | 112 | 292 |
| Russell | 57 | 27 | 132 | 526 |
| Stormont | 2 | 0 | 0 | 0 |
| Victoria (Fenelon, Mariposa, Eldon and Emily Tps.) | 31 | 15 | 334 | 372 |
| Welland | 4 | 1 | 2 | 55 |
| Total | 603 | 300 | 1,786 | 4,843 |

APIARY INSPECTION IN A. F. B. DISTRICT.

| County. | No. visits to Apiaries. | No. Apiaries found diseased. A.F.B. | No. Colonies found diseased. | Total No. Colonies in diseased Apiaries. |
|---|---|---|---|---|
| Algoma | 2 | 0 | 0 | 0 |
| Brant | 4 | 0 | 0 | 0 |
| Bruce | 44 | 9 | 72 | 244 |
| Dufferin | 6 | 2 | 17 | 31 |
| Dundas (Winchester Tp.) | 2 | 1 | 3 | 37 |
| Essex | 30 | 8 | 13 | 108 |
| Grey | 91 | 33 | 141 | 795 |
| Halton | 3 | 2 | 5 | 55 |
| Kent | 18 | 6 | 54 | 251 |
| Lambton | 103 | 31 | 107 | 466 |
| Lincoln (Beckwith & Montague Tps.) | 2 | 2 | 14 | 29 |
| Lincoln (Grantham Tp.) | 7 | 4 | 23 | 28 |
| Manitoulin Island | 53 | 1 | 4 | 4 |
| Middlesex | 61 | 13 | 39 | 259 |
| Norfolk | 23 | 10 | 65 | 142 |
| Ontario | 19 | 6 | 23 | 148 |
| Oxford | 39 | 13 | 55 | 109 |
| Parry Sound | 7 | 3 | 4 | 72 |
| Peel | 2 | 0 | 0 | 0 |
| Perth | 26 | 11 | 31 | 253 |
| Simcoe | 68 | 27 | 65 | 572 |
| Victoria (Fenelon Falls & Mariposa Tps.) | 2 | 2 | 4 | 49 |
| Waterloo | 12 | 2 | 6 | 66 |
| Wellington | 39 | 20 | 84 | 348 |
| Wentworth | 15 | 5 | 16 | 24 |
| York | 35 | 8 | 83 | 180 |
| Totals | 713 | 219 | 928 | 4,270 |

It will be seen from the above schedules that 1,316 visits were made to apiaries by inspectors during the season of 1914, and that while in the European Foul Brood district 50 per cent. of the apiaries visited were found diseased, only 31 per cent. of the apiaries visited in the American Foul Brood district were found to be in this condition. In other words whereas the inspectors only went to apiaries where disease had been reported or was strongly suspected, seven out of ten such apiaries in the American Foul Brood district were found to be free of disease. This shows that the educational campaign which we have been conducting for several years is bearing good fruit.

While it is exceedingly regrettable it is not surprising that European Foul Brood is still spreading rapidly. Some new counties have been taken into the diseased area this year. It is only a matter of time until the whole Province is covered. Nothing but careful requeening with vigorous stock and advanced methods of management will save any apiary in Ontario from ultimate destruction. By our publications, demonstrations and inspectors, practically every bee-keeper of Ontario has been repeatedly warned, yet comparatively few have taken heed, or will heed until the enemy is upon them, and they have suffered heavy loss. In the infected areas the business has been reduced to the very few who have taken advice and are building up their apiaries again to a paying basis. These few are proving the truth of what has been said and their evidence is of great value in the educational campaign still being waged in advance of the disease.

No doubt one reason for the indifference to warnings in the European Foul Brood counties is the fact that previously no bee disease had been known there. It is only this year that the American and European Foul Brood territory begins to overlap—in Victoria County. From now on we can expect an increasing number of cases of the two diseases in one and the same colony. This will no doubt make it necessary to treat all such colonies by requeening for European Foul Brood, and by shaking for the American variety of disease.

## Apiary Demonstrations.

The following chart shows the Apiary Demonstrations held in Ontario during 1914:

APIARY DEMONSTRATIONS IN ONTARIO, 1914.

| County. | Place. | Attendance. | County. | Place. | Attendance. |
|---|---|---|---|---|---|
| Algoma | Sault Ste. Marie. | 4 | Leeds | Athens | 60 |
| " | McLellan | 26 | Lennox | Camden East | 4 |
| " | Bar River | 33 | " | Selby | 50 |
| " | Steelton | 8 | Lincoln | Smithville | 80 |
| Brant | Cainsville | 45 | " | Vineland Station | 35 |
| Bruce | Teeswater | 35 | Middlesex | Strathroy | 75 |
| " | Dobbinton | 35 | Northumberland | Warkworth | 40 |
| Carleton | Woodlawn | 12 | Ontario | Uxbridge | 40 |
| Dufferin | Mansfield | 16 | Oxford | Thamesford | 33 |
| Dundas | Morewood | 16 | Parry Sound | Powassen | 20 |
| " | Williamsburg | 23 | Perth | Tavistock | 50 |
| Durham | Bowmanville | 34 | Peterboro | Lakefield | 40 |
| Elgin | West Lorne | 82 | Prince Edward | Milford | 10 |
| " | Aylmer | 34 | " " | Bloomfield | 25 |
| Essex | Essex | 75 | Renfrew | Hurd's Lake | 30 |
| " | Essex | 55 | Russell | Bear Brook | 15 |
| Frontenac | Godfrey | 30 | Stormont | MonklandStation | 46 |
| " | Arden | 25 | Temiskaming | New Liskeard | 23 |
| Glengarry | Alexandria | 35 | Victoria | Little Britain | 26 |

APIARY DEMONSTRATIONS IN ONTARIO, 1914,—Continued.

| County. | Place. | Attendance. | County. | Place. | Attendance. |
|---|---|---|---|---|---|
| Grenville | Merrickville | 20 | Victoria | Lindsay | 23 |
| Grey | Neustadt | 30 | Waterloo | Floradale | 53 |
| Haldimand | Caledonia | 39 | " | Preston | 36 |
| Huron | Brussels | 13 | Welland | Port Robinson | 23 |
| Lambton | Rutherford | 40 | Wellington | Fergus | 15 |
| " | Petrolea | 65 | " | Harriston | 30 |
| " | Forest | 80 | York | Strange | 40 |
| Lanark | Carleton Place | 18 | | | |
| Leeds | Elgin | 31 | Average.. 34 | Total attendance | 1,861 |
| " | Mallorytown | 30 | | | |

It will be seen that 55 demonstrations were held in all parts of Ontario with a total attendance of one thousand eight hundred and sixty one persons. In 1912, the average attendance was 25, in 1913 it was 32 and this year 34, showing an increased interest from year to year.

The value of this work, great as it is, might be increased by establishing demonstration apiaries, particularly in districts infected by disease, where the discouraged bee-keepers might be shown how bees can be profitably kept in spite of obstacles.

This report would not be complete without mention being made of the public spiritedness and the hospitality of several who have given their assistance. Fifty-five bee-keepers, have, at considerable inconvenience, allowed their apiaries to be used for demonstrations. In many cases their wives and other ladies of the neighborhood have provided refreshments for the demonstrators and for the bee-keepers in attendance. Hundreds of other bee-keepers have given a hearty welcome and cordial hospitality to the inspectors on their rounds. All this is very much appreciated both by the inspectors and by the Department, and goes a long way towards smoothing the path of the public servant which is not always lined with roses.

## DISCUSSION.

W. V. Bowen, Niagara Falls: Two or three years ago early in the spring we found brood cells which we were pretty sure were European Foul Brood cells, but we were not altogether sure. We started at it by giving them a little feed each night. We gave them sugar syrup and feed them partly honey. We thinned it down and had it, I might say, boiling hot, so that it would kill any germs in the honey. We gave this feed and built up the colonies a d got them very strong in this way. We found that the foul brood did not spread; if anything it diminished. Then again we found that it was not being cured as fast as we would like and then we decided to Italianize. I doubt if there is a black colony in the yard: there are a few hybrids, but we have now our apiary of 200 colonies very well Italianized. This fall we have not found any European Foul Brood in the yard, but at the same time I expect to find it again in the spring, but we will still go on and cure it in the same way.

W. B. Angle, Fenwick: Being an inspector during the past season and for two or three seasons I have had considerable opportunity of seeing a little along

the line of inspection work, and one point that I think is one of the best in curing and getting rid of your disease is in our slogan "Every bee-keeper is his own inspector." I know a case right in my own home, and Mr. Armstrong can cite the same case where he inspected, a bee-keeper moved diseased bees in there in the first place, a man who knew nothing of the disease and was moving there, moved his bees there innocently. He felt very sorry after he found out he had the disease, and knew he should not have moved them there. Nevertheless those of us who were around him keeping bees took an interest in him and he in us, and we got together with the inspector of that locality and we cleaned that yard up last year. Mr. Armstrong and myself examined that this spring and found no disease. Now, I am speaking of American Foul Brood. This fall that apiary is still clear of American Foul Brood and I am pretty well satisfied it is gotten rid of. But in treating that there wasn't anything saved that we thought would in any way endanger the rest of his bees or those that were near him. Then again there is one step we should take as bee-keepers in preventing the spread of the disease and that is in legislation. Another clause should be inserted in our Act to prevent bee-keepers having diseased bees from moving them. The law at present says they shall not sell them or give them away, but it does not say they shall not move them from one locality to the other, and I know that seems to have been the cause of the spread of the disease.

Mr. Armstrong: I might say that I have not had very much experience with curing European Foul Brood. In the counties where I have been inspecting it was mostly American Foul Brood and mostly in the western part of Ontario, and there is no European Foul Brood any further west in the north part of Ontario than Victoria County and in Welland County. It has not got across Welland County yet. As far as treating it, or anything along that line, or any way of curing it, I have had very little experience. The only thing the inspectors are supposed to do is to go to a man's yard and if they find it tell him what to do with it. In some cases where I have been staying over night with a bee-keeper and got there perhaps at six o'clock in the evening and he had two or three colonies diseased with American Foul Brood I have gone to work and helped him clean them up right there. That is, the first treatment. For the second treatment, if there was some other live bee-keeper there, I would see him and have him watch the case. There is no trouble at all with the live bee-keepers, it is with the small bee-keepers where we have the greatest trouble. But I find, as Mr. Bowen has said, that there is one thing about European Foul Brood, that you must keep your colonies strong. If they are not strong feed them as Mr. Bowen has stated—feed them up till they are strong, for with a weak colony the disease still seems to stay there. With European Foul Brood the bees, if they get strong, can clean every trace of it out. I have examined colonies and have found fairly bad cases, and then I would go back in a month or two and could not find a trace of it, and there was nothing done with that colony only they had built up strong and perhaps in the meantime had swarmed. You know what that means: they are eight or ten days without a queen and there is no brood, and everything is cleaned out and they can carry out the scales with European Foul Brood. But with American Foul Brood they cannot, it does not matter what strain of bees it is. Bee-keepers from the other side that have had more experience than we have state that certain strains of Italians will keep it cleaned out. Mr. House told me last year he was surrounded with apiaries with black bees in and this one yard was there, and he got a fairly good crop of honey every year and he was doing nothing only keeping

strong colonies and a good strain of Italians. You have got to keep them strong and by doing that they will clean out European Foul Brood, but I have never come across a yard that was cured and would stay cured, with European Foul Brood; it would crop up. You might go along to-day and you could not find a trace of it; you might go along in two weeks and you would find it in quite a number of colonies. That is one thing about it, we don't know how it spreads. Dr. Phillips, of the United States, is perhaps, the best posted man in America along that line, and when I asked him that question he said he did not know, and I do not know. We know when we go into a yard when there is European Foul Brood we find it in nearly every colony in the yard. With American Foul Brood it is quite different. There might be a colony or two in that yard for two or three or four years and it won't spread over the yard.

MR. CHRYSLER: It has been suggested and mentioned, and probably I have mentioned it before, that every bee-keeper should be an inspector of his own. We have been for years past increasing the number of inspectors. The time should soon come when we should be able to reduce the number of paid inspectors unless we are offered an increase of grant from year to year. The reason I speak of that is this, that the inspectors now employed are not employed the whole season through; they are not given a chance to clean up the colonies in localities that they know are diseased, as they cannot get around to them before they are being called off and the money is all spent.

THE CHAIRMAN: Mr. Evans and Mr. Chrysler have introduced another phase of the discussion of this question and that is as to wherein the Government may most effectively aid in this work. That is a point on which I, on behalf of the Department, would cordially invite a very free and frank discussion. It has been our purpose in the past to aid as effectively as could be suggested in the control of this disease. I may say frankly that I have been somewhat perplexed that the reports from year to year, while they have indicated increased inspection, have not indicated that the disease was being placed under such control as might have been hoped. Now, the question is whether or not a change in the methods is required or whether an extension of the methods that have been adopted in the past is really what is necessary. I quite agree with your slogan, which is, "Every man his own inspector." If that could be worked out I am sure it would be most effective in what could be done. It may be, and I can quite conceive that it is, very difficult to get those who are indifferent to the importance of this to realize the necessity of the work or to appreciate the method by which it can be done most effectively. To remedy that condition, to give them the instructions which will enable every bee-keeper to be his own inspector, is one of the objects of the Department in the work which it is carrying on and I invite any suggestions or discussion on that as another phase of this question.

MR. PETTIT: A suggestion came to me from New Zealand of a new line they have taken up in this connection; they have inaugurated a registration system for all bee-keepers. All apiaries have to be registered, as in this country all dogs have to be registered. Everyone who has one or more hives of bees must have his name and address registered with the Department of Agriculture in New Zealand according to their most recent enactment, and that gives the inspectors an advantage in locating the bee-keepers and finding where the disease is.

MR. GALBRAITH: There is one thing I would like to say about the inspector business and that is this: so long as people have foul brood in their yards and have no scruples about selling diseased honey you are never going to get ahead of foul brood. In fact if they do not sell the honey all in the city they sell it to their

neighbors around, and the neighbors as they use those cans are not very particular about them, they throw them out, and whatever bees are in that locality get at those cans and carry the disease. What is the use of talking about inspectors and keeping them going around when the bee-keepers themselves are trying to spread the disease.

MR. HOLMES: If inspection work had not been conducted among bees and the methods of cure had not been made known as well as they have we probably would have had less bees in this Province. I believe that. The inspection work has been done and done all right; I am not going to find fault with that because of the fact, and it is a fact, that it is easier much to stand outside and find fault with the job than it is to go and do it yourself. Inspection work has been all right up to this point. If it can be improved, all right.

MR. BOWEN: In regard to the slogan "Every man his own inspector" I gave a little experience with European Foul Brood a few minutes ago, and I might say that if I or my father had not been keeping close watch upon our bees we would never have known that European Foul brood was in our yard unless our inspectors came around, which is not very often as they have so much work to do. But we keep watch on our bees; we found there was something wrong with the brood and we sent for an inspector. As soon as we found out for sure it was European Foul Brood we set to work and cleaned it up.

MR. COUSE: There is no doubt in Mr. McEvoy's time people were educated to a considerable extent, but since the inspectors have become greater in number there is no doubt at all but what bee-keeping has become educative in a sense, and all these inspectors going through the country surely must teach people what foul brood is. It is the same old slogan. I know what it is, I do not need to have an inspector at all. I am watching for it every day. When I open a hive of bees I can travel over the comb, and it is wonderful how expert you can become. It is up to us all to get that knowledge so that we won't need the inspectors around. If we are going into bee-keeping and the registering of bee-keepers you could almost go further and you could give them diplomas if it were necessary to register them, and do not let a member have a diploma till he could tell foul brood. Mr. Evans has said that even people that have bees do not know foul brood, but even does not doctor himself, he gets some one else to do it. I believe it is not practical just yet to give diplomas, but I believe the day will come when you can give them. If you were to put bee-keeping into an expert line then you could give diplomas, and have the man know what it is. I do not know but what you might in this room give ninety per cent. of the people here diplomas for foul brood, but the great difficulty is just to get people to give it the full amount of attention that is required to cure it, and that is a whole lot. I think Mr. Pettit or any of the inspectors can teach almost any one. from a boy from ten years up to a man of fifty, what foul brood is. There were thirteen hundred apiaries inspected and $4,000 spent in doing that, which is about $3 an apiary. That is not very much. If I owned a hive of bees and could not inspect them, I would soon give three dollars, and I think there might be some way that anybody could hire somebody if he wanted to. This thing has been on the go so long, but have we made the progress that we should? It appears to me that in all the years we have had this question discussed you do not notice very much improvement in any one year, but take ten years you notice it, and take thirty years and it is very great. The only thing is to peg, peg away, and never quit, then you will make a success.

MR. VANDERBURGH: I do not know much about the foul brood situation outside of my own apiary, and my immediate neighborhood, but I have had con-

siderable experience in foul brood. In 1893 foul brood broke out in my apiary the first time, and got the start of me, and before I got through with it I lost seventy colonies. That was the beginning. I got it cured up, and ran along for years without foul brood, which satisfied me it could be cured. Later on it broke out in our neighborhood again, and there was a man with an apiary some five or six years ago who had some fifty or sixty colonies. Foul brood got started in his yard and since that time there has been at least five different inspectors—a different inspector each year for five years—who has visited that apiary and inspected it, and it just went down gradually, getting less and less every year till it has all rotted away with foul brood. It is within a mile and a half of my place and I have been contending with it.

Mr. Angle: Is that all the fault of the inspector or the fault of the man who has the disease? I think in a good many cases it is due to the bee-keeper himself. There was a chance for Mr. Vanderburgh to go and help his neighbor and to have given valuable assistance. I think if the inspector did a little bit of coaching he wouldn't want his neighbors to be in at his bees very often. The inspectors are blamed for some things that are not really due them.

Mr. Vanderburgh: The inspectors did that part of the work all right but I think it was their place to compel this man to clean up.

Alf. Denison, Pana: Take ninety per cent. of the bee-keepers that have foul brood and how are you going to get at them? I went to one man especially and as soon as I went there he said, "I have got foul brood, I can show it to you," and he insisted on my going to see a hive which he had in the cellar. I wanted to go into his yard and look for it, but he went in the cellar and brought out the hive, pulled out the frame, and he said, "There is foul brood." He had a few symptoms of it in his yard, and I went to work and he was perfectly willing to get it cleaned up, but he did not want to have anything to do with it himself. There is any amount of foul brood in our county yet, and we have got to do something. The bee-keeper who does nothing else but keep bees is looking after it, but it is the one that is keeping it as a side line that is not looking after it.

Mr. Hopper: I submit if we tax ourselves a little in order to raise sufficient funds we can go with good grace and ask the Department for more money to carry on the work.

Mr. Pettit: Mr. Denison is referring to European Foul Brood district, and our policy, owing to the great need of inspectors everywhere, has been to warn bee-keepers and tell them of the remedy, showing them that the remedy is in their own hands, and if they take that remedy, they save themselves, and do not need to worry much about their neighbors. Those who refuse to take the remedy have to suffer the consequences. I think that accounts for the fact that the inspectors have not been so thorough in those districts as they have had to be in American Foul Brood districts where conditions are different, the disease being more persistent, and requiring the thorough attention that it does.

Denis Nolan, Newton Robinson: It is now, I think, about twenty years since I first attended a convention here, and I have heard foul brood discussed in those days as we hear it this afternoon. It seems to me it is one of the troubles with which we are confronted, and I suppose we will be, I do not know for how long. Somebody suggested this afternoon that contagious disease within a human family could be controlled. No doubt that is so. The laws for the safeguarding of the human family of late years owing to the strict quarantine regulations, and so on have made it possible to control those diseased. I do not think there is as much danger from contagious diseases now as some years ago. I do not hear about the

ravages of them the same as I did in the days I speak of when attending the first convention; and when we come to consider that foul brood is a contagious or infectious disease which is one of the hardest things to control that I know of—because, while you can control a family of seven or eight people and keep them confined to their own house for a month or six months if the law says so you cannot control a colony of bees in your own apiary for any length of time. They are at liberty to roam about, and no matter how successful a bee-keeper may be or how careful he may be in his own yards, he has not control of the small yard to which his own bees may have access, and for that reason it is going to be a long time before we will have those diseases absolutely under control.

In regard to making headway, I think we have made headway. We must further consider that while some years ago we were only combating American Foul Brood, now we have European Foul Brood to meet as well, which seems to sweep across the country at a rate altogether different from what the other disease does. It seems with the two that sometimes we think we are not making progress, and of course with regard to the inspection work, the financing of it and so on, which seems to be growing year by year, we need more inspectors. Now we have twenty-one inspectors; some years ago we had one. The work seems to have to be done just about the same. While the year 1914 has been a poor year for bee-keepers, I think it has been a pretty fair year for disease. Bees have robbed this past year for a great part of the summer day after day. They had an inclination to rob because there was not any honey and no nectar in the flowers, and they used up the last drop of honey in the hives, and if there was any disease lurking at all no doubt it had a chance to be spread around. I think in the year 1915 there is going to be more work done than in 1914 or previous years. My friend Mr. Evans says he was a mendicant. I also was a mendicant, and we went to the Department to ask for an increased grant for 1914, and I went up there with the full feeling that this increase was necessary for 1914. I think the work for 1915 will be still greater than it was in 1914, and I think while we did not succeed in getting the increase for 1914 I look forward with the expectation and hope that we will receive an increased grant for 1915. Mr. Roadhouse has suggested this afternoon that we should offer some suggestion or something by which we could improve matters towards getting ahead. I have not any suggestion particularly to make as to what we might do only this, I would suggest that you might change your delegation.

THE CHAIRMAN (Mr. Roadhouse): I may say, in reply to some of the suggestions that have been made, just a word as to the attitude of the Department on other matters. Reference has been made to the inspection for San José scale. This inspection is carried on under the Department of Agriculture. The inspectors, however, are appointed by the Municipal Council, and are paid one half by the Municipal Council and the other half by the Department. That is the only inspection that I recall at the present moment that is analogous to this case. We do not carry on or supervise the inspection of live stock beyond that which I mentioned a while ago in reference to stallion enrolment. The inspection for contagious disease is carried on under the Department of Agriculture at Ottawa, and through them the health of animals branch, which is under the supervision of the Veterinary Director General. As to whether or not they make any charge I am not in a position to state. I have never been aware that they did, but not having the official information before me at the present time I would not like to make a statement with reference to the regulations of another Department. However, I am very glad to hear this discussion this afternoon. It brings home once

more the importance and seriousness of this problem. I am very glad indeed to hear the statement that progress has been made. It would indeed be an unfortunate commentary if after the expenditures that have been made and efforts that have been put forth it could not be claimed some progress had been made. With you, however, I would like to see a little more rapid progress; I would like to see definite and distinct progress made in certain localities at least; I would like to see if it were at all possible the disease cleaned up to a very large degree as we go along so that from year to year we might say we had so much done and there was this other district that had to be cleaned up. Now, I do not know whether something along that line could be adopted and worked out satisfactorily or not, but I feel sure that the discussion which we have had this afternoon will be very helpful in reaching an ultimate conclusion which should be promising of fruitful results.

H. A. McNaught: In the matter of clearing up one part of the district, we have so many bees in bee trees it seems to me impossible to clean it up. I think that is the reason the thing has continued so long. In our part of the country where we have a hardwood bush quite often men find them in trees. I am inclined to think with a good many that we should carry out the slogan and train the bee-keepers to be his own inspector.

## PUTTING UP A HONEY EXHIBIT.

H. G. Sibbald, Claude.

The subject that has been assigned me this year seemed to be not very deep and as if I could not get very much out of it, and perhaps there are not very many bee-keepers that are interested in putting up a honey exhibit, but my first remarks will be along the line of whether we should not become more interested in putting up honey exhibits; that is, bee-keepers in their own counties and townships. Now, we have often in discussing the selling of honey and getting a market for our honey had the question of co-operation come up, and it has been threshed out year after year, and one great advantage that we could derive from co-operation would be in a general scheme of advertising honey—some general scheme whereby honey might be advertised in the daily newspapers and weekly newspapers all over Ontario and all over Canada, the same as cereals and breakfast foods of all kinds are advertised. You know it has a wonderful influence on you when you pick up a paper and you see something in it day after day and week after week—some startling "Ad.," perhaps it is only a name; even if it was just "Eat Honey!" It would have quite an influence on people; it would make them think of it. They never think of honey because it is not a staple article they expect to buy such as they do sugar and flour. They do not think of honey until they see it and hear about it, and that is one thing that I regret that we have not got a general scheme whereby bee-keepers could contribute a certain amount of honey and an advertising campaign could be kept up all the year long in the papers and in the home journals. It wouldn't matter if it was just to take some home journal that goes into a lot of homes and have a good advertisement in that about eating honey, how healthy it is, and what a pure sweet it is, and so on. We regret we have not got that; we do not seem to be able to get a plan whereby we can get it; but we have a plan where we can advertise honey to a very great extent and that is by making exhibits and exhibitions and fairs throughout the whole of

Ontario and the Dominion of Canada. There is not anything which makes a person think of honey more than to see it; it is a very delicious looking sight. If a storekeeper will keep honey on a counter he will sell three times as much honey as he will if he puts it away back on a shelf where people do not see it. Just because they come in and it looks nice and attractive they pick it up and say: "How much is your honey?" and take home a jar, where they did not intend to take honey at all, only from seeing it. Private bee-keepers do not like to spend a lot of money advertising honey, because others would derive as much benefit from it as they would themselves, and perhaps it would not pay them, but as a whole I think it would pay. Nearly every fair in Ontario offers a small or large prize or some prize for honey, and it is the duty, I believe, of the bee-keepers to see that there is a nice exhibit of honey put up at the fair. The prize may not be very large; in lots of cases it is not worth the trouble of putting up an exhibit, but as a bee-keeper you should encourage the exhibiting of honey, and you should see that some one puts up honey there—a nice exhibit. If the prize only calls for ten pounds of honey, there is no harm in going there with 25 to 50 pounds of honey in glass and putting it in a nice attractive way. There is nothing enticing about honey in tins at a fair; you cannot see the honey—only the word honey on it; but if the honey is put up in a nice pyramid people will generally speak and think and talk about the honey. If the exhibitor can spare the time and is enthusiastic enough all the better, if he can tell them about it and educate them about it. They will come up and ask questions, and you can talk to them without any embarrassment at all and tell them why honey granulates, it is natural, and so on. Lots of people think it is adulterated when it is granulated, whereas we know as a fact it is a good proof of purity. They will never forget being told that. Now, often these prizes are very small, but you could perhaps improve that if you have a director on the board of the fair that you know very well; go to him before the meeting and tell him that you would like to make a better display of honey and how attractive it is, and try to see if he cannot get a few dollars more added to it. I remember in my own experience, when I was starting in bee-keeping I exhibited at the township and county fairs; I did not know the directors very well, being a young fellow at the time, but I had an uncle that knew them very well, and he said, I believe I could get them to give a larger prize for honey up there." "Well," I said, "Try and see if you can." So he got them to increase the prize year after year until they got quite a nice little sum, and I was doing very well then. My friend Mr. Ling was attracted all the way from Milton, and he came over to show against me, and I had quite a lot of opposition. We put up a great display; we had a second Toronto Exhibition. Now, that did good: it brought me plenty of customers; people came from the town of Brampton and bought honey from me year after year. I still ship honey to Brampton, just from the fact that I exhibited at Brampton twenty years ago. Now, that is a field for the young bee-keeper. That is the place a young bee-keeper should go to get customers and to find a market for his honey. He should not depend on the wholesale markets, but go to the fairs and go to the local markets. I remember coming in here to Toronto years ago bringing honey in and putting up a nice display. I put a pyramid up, and put it up high enough so that they could see it. In that way I sold to a lot of private customers, and gradually the wholesale men came and said: "What will you take for two or three dozen of those jars?" and I would give them a wholesale price, and I would take the jars around and go and collect the money. In that way I soon got enough customers in Toronto without

going to market. I do not say it is not good to go to the market, but some younger persons can take that up and either make exhibits at fairs, at markets, or any place where there is a crowd where people gather to see the honey.

A report will appear in the newspapers what a fine exhibit of honey it is and you will get a lot of free advertising out of it. I think I have covered the ground pretty well as to the necessity or the opportunity that bee-keepers have in advertising at fairs.

In putting up an attractive exhibit of honey the first thing I would think of importance is to get one particular feature in your mind. Get one thing that is going to be startling and attractive—one big pyramid, one big pile of comb honey —a centre of attraction, one great dominant feature, that is what you want to attract people to. You only want one; you do not want to mix it up and try to put up too many. Try to put your mind to it so that you can get one thing that is either original or a large bulk which looks as if it was going to fall down perhaps, or something to attract the people so that they will stop and look at it, or see it from almost any part of the building, and then the rest will all follow. If your big feature is in the centre of the table then the rest must balance, must drop away nicely to the edge and be well trimmed around and kept well in proportion. Do not have it heavy at one end and light at the other, or uneven. Throughout, but keep it nice and even, with some symmetry about the whole thing. Falling away from your one big feature, the comb honey might be used for that feature. A large pyramid might be used, or it may be that live bees might be used for that attraction, although I do not put such a high value on live bees as an exhibit as some people do, because I think they detract from the honey. People like to see the bees, they are attracted by them, but they come asking you questions about bees instead of about honey. That is not what we are there to advertise—not bees, but honey. There is no doubt bees will attract them, but I would put more stress and more emphasis on the fact that I would like that big feature made of honey, either extracted or comb.

Now, there is the matter of packages for honey. If you get a jar that is low and thick the honey does not look so bright in it; it gets dense and heavy looking. A tall jar will show off the color of honey much better, and in selecting packages it is always better to get tall jars; and then we want white flint glass. There is a glass that is green like the fruit jars, and they give a nasty cast to honey. They do not show it in its true light, and we should not get them. Then we want different sizes, and it is better as far as possible to keep to practical sizes. Keep the sizes that after the exhibition is over you will be able to sell without having to empty your honey out again; that is one pound, three-quarters and half-pound jars. Get as many of those as you can, because they are practical sizes and they are saleable in any store. If we get a lot of fancy glass with glass stoppers and high-priced glass we will not be able to dispose of it; you will have to empty the honey out, and keep your glass until next year. But it is necessary to have a certain amount of fancy glass in an exhibit. Some people think we ought to exhibit honey just in practical saleable packages, such as ten pound tins, five pound tins, one pound jars, three-quarter pound jars and half-pound jars. That is all very well, it is practical, but it is not as attractive as if we mixed in with that a number of fancy glass jars, and it is necessary, to put up an attractive exhibit, to have some fancy glass, and the more you have the more attractive it makes it; but you must not get your pyramids too heavy. A pyramid seems to be the nicest way of showing honey. Over in the States you will see by the pictures of honey exhibits they

have a plan there for putting it up on shelves. Quite a lot of them make shelves one above the other and put money on the shelves, and we have tried that here, and you can try it anywhere yourself. You can put a jar of honey on a shelf and you will find it will not show off anything like as well as if it is piled up on sheet glass in the form of a pyramid where the air and light can get all round it. There is nothing like a nice light corner for honey; plenty of light shows it up better, and in using the pyramid style it is necessary to have a number of sheets of plate glass, strong glass for the bottom and lighter glass as you go up. Do not pile the pyramid too full, keep it light, with plenty of light through the jars. One jar sitting right behind another spoils the look of both. Keep them far enough apart so that the light can get between them and there is no necessity for piling so many on.

Then, comb honey. There is another feature of exhibiting that I always appreciate, but I did not mention before, and that is the improvement that it would make in bee-keepers. A bee-keeper goes to a show and puts up a dozen of comb honey, and he finds two or three other bee-keepers there putting up two or three dozen which are far nicer, better filled and cleaner. He will go home and think over it, and if he has got any ambition, any enthusiasm in him he will try to work out a plan to have his comb honey better. He will try to find out where he failed, and next year when he comes back to the fair he will have an improvement in his comb honey. That was one point I intended to emphasize. Comb honey it seems to me is always more attractive in boxes that we call practical every day comb honey cases. A section sitting outside of a box shows the wood, and the wood is not as attractive as the face of the comb. Then, if there are any holes at all, they are found to be shown. Then, showing the section without a case shows off the unfilled row around the wood, which is not attractive at all. Put up in one of our nice white basswood cases, keeping them perfectly clean and have the glass nice and clean and clear in front of it, and I think it is really a nice sight shown in that way.

In the matter of putting up an exhibit I never could appreciate mixing the comb honey and extracted honey very much. I always thought they looked better separate. That is, a pyramid of comb honey or three or four pyramids of comb honey, perhaps one on each corner, or one large pyramid or any way you like, but keep them separate, because if you build up a nice pyramid of extracted honey and put a box of comb honey in the centre it hides the view of the back part of your pyramid, it is only a box except the front and the front is all you need to show, and it should be piled in such a way that the front is the only part that does show.

Then I have been able to use, and I think to advantage, buckwheat honey in showing off a display of comb honey. The dark color seems to make the comb honey look whiter, and it fills in the little holes between the boxes and makes a finish to your exhibit, and at the same time makes such a contrast that you appreciate the whiteness of the comb more than you would if it was not there at all, and in that way you can use buckwheat honey in your exhibit just as you should use buckwheat honey and granulated honey and liquid honey, and show the people honey in every form. People come along and say, "What is that dark stuff? Is that blackstrap, is it molasses?" You say, "No: that is buckwheat honey." "Oh, I never heard of that before." Then they see granulated honey and they say, "What is that?" "That is honey when it candies and granulates; it comes to that stage." You explain that to them. "Oh, why, I have got a jar at home like

that; we have had it there for a couple of years. I thought it was sugar; I did not think it was any good." You say, "It is all right, put it in warm water; let it heat awhile, and it will come back to the same form." "I am glad you told me that; I will do that." There is a person who goes back, and is able to tell the neighbors and friends how to liquefy honey. That is the way fairs and shows do a lot of good in educating people.

Now, it is all right to show beeswax at fairs, but we have not had any difficulty so far in finding a good market for beeswax, and it does not seem to have needed much advertising, but a little beeswax alone shows a by-product of the apiary, and it can be put in some place where it won't detract from the honey and it may find you a customer for beeswax that will come very handy when you want to sell.

THE PRESIDENT: I think we as beekeepers as a rule have not appreciated the advantages we have received from advertising in the way of exhibitions of honey. I look upon our exhibitors in the past, aside from helping themselves, as being benefactors for the bee-keeping industry at large.

MR. GRAINGER: Mr. Sibbald spoke about granulated honey and making a point of showing it. That is all right if you want to educate the people; but in my experience I have found that granulated honey is not popular. I cannot sell it. If I show people a sample of granulated honey in a pail they say, "Oh, give me some that is clear." While I believe it is nice to have some granulated honey in some glass packages I do not think it is a good thing to emphasize it very much except as an educative feature.

He also spoke of bees in exhibits. Now, my experience may be a little different to his, but I have found live bees one of the best attractions at an exhibition. It may perhaps detract from the honey show, and people may want to ask questions about bees; but that is the chance to give them information, tell them about honey and make the sale. I think many times people are attracted who otherwise would not look at honey at all. They say, "There are some live bees; where is the queen?" And they ask questions, and you can get a chance to sell. There has been a good deal of valuable information given to the public around a little box of live bees at an exhibition.

I think another thing he spoke about was not using fancy glass—well, he did recommend it somewhat. But if you are selling honey I have known people to pass by the ordinary packages time and again, and if you have not a fancy package they will not buy at all. I believe that is the experience of some of the others here to-day who have been exhibitors at Toronto. In store windows and other places there is no doubt you can sell a limited quantity of fancy glass. I have noticed it in illustrations of exhibits put up on the other side. So often you see them put on the wall, on shelves, like grocers put tomato cans up. It is a poor way to show honey, either in the store or exhibition. But, there is one way you can get over it somewhat, if you are in such a position in the store that you have got to choose the wall, and some times there is no other space. If you make the background on the shelf so that the honey stands out you can make an attractive show even for a shelf by the wall, and one of the best things to put behind it is a mirror, and your honey will look a great deal better than it will without such a background, and instead of looking like one shelf you can arrange it so that it will look like a whole lot of honey away back in, and it emphasizes a great deal the size of your exhibit.

The next point I notice is comb honey. I do not know that it is much benefit to a display to have it mixed up. Mr. Sibbald recommends that you keep it separ-

ate, but I can never understand why it does not make it look more attractive if your comb honey is piled in such a way as to have these little corners with some fancy glass, that is in place of the usual buckwheat or granulated honey or the other kinds you want people to see.

With reference to selling comb honey, I have found it best every time to have little cardboard boxes to slip the comb honey into when you are making a sale, even if you sell only a little; have them with your name on and have the comb honey put up in a box so that they can carry it away conveniently and then it saves time.

There are a few points I will endeavour to make in addition to what Mr. Sibbald has mentioned. There is a point in starting out to put up an exhibit, whether it be in an exhibition or in a store window. If you are starting to build a house, the first thing you would do would be to make plan. You want a plan first. I remember the first time I put up a boathouse when I went to Muskoka. I measured out six feet from the beach and put down a post, and then went off ten feet and measured up another six feet, and put down a post. Of course the shore was not even, and when I came to put the boards on the roof they were all askew; instead of being square they all stuck out and the boathouse instead of being square was diamond-shaped. That is just an illustration to show you that you may measure it out all right and still be all wrong, and the best thing to do is in making an exhibit of honey to have a plan to start with. The next thing I would think about in building a house is to have a good foundation, and if there is anything in this world that should have a good foundation under it it is a pyramid of honey.

Another thing to make honey look good is a loose formation. There is no use putting up a beautiful display and then putting a lot more stuff in front of it and hiding it. The old fashioned way to tie up a bouquet of flowers was to tie them in round and even and smooth and every flower packed tight. You never see them that way now, but every flower so that it shows. The same applies to anything. If you want an artistic display of flowers or honey or anything you want it loose enough so that every package is seen and you get the benefit of it.

Now, about packages, Mr. Sibbald made a splendid point when he said a long narrow package was the best. Of course we all know that. If you try to make a display and the honey is a little dark, and you want it to look clear, about the worst thing you can do is to put it in a jar that is very thick. You can have a good solid foundation and still have it long and narrow. It is not necessary to have a big, thick jar at the bottom so that the honey on the lower part of your pyramid looks so much darker when you are looking through a whole lot of it than it does if it is in nice narrow glass.

With reference to putting up exhibits in store windows I want to tell you one little experience I had in that. After the exhibition was over a grocer in the city come to me. At that time we were putting up grocers' windows for display at the exhibition; there was a prize offered, and one of my customers that saw a display there said. "Now, I like that; I have some mirrors at home and I would like something like that put right in my window, will you do it?" I said, "Yes; when the exhibition is over I will put it in for you." He did not sell very much honey up this time. So we put him up a display something like we had at the exhibition right in his window on Yonge Street, and you would not believe when I tell you how much that man increased his sale of honey.

There is another point a lot of people you sell honey to do not understand. Did you ever see comb honey put into a refrigerator? I have, lots of places in this

city. They put comb honey where they put butter and eggs, where it will draw the moisture and spoil sure.

Another thing. Honey goes all right with certain goods, but it is a mistake to mix it up with some others; it is just as much out of place in some windows as a cauliflower would be on a lady's hat instead of a nice flower. If you go into department stores to-day you will never see a honey display in windows where they put dry goods, ribbons and stuff like that. Some people have gone to that extreme in putting up a show of honey, putting ribbons and stuff of that kind. I never thought it was good taste. I believe in making the surrondings of good bunting and that kind of thing up above it, to make a background, but mixing it up with the honey it seems to me is altogether out of place and bad taste. Natural flowers and plants or decorations with things of that kind, fit in with anything.

Mr. Pettit: I notice as the financial reports come in from the different county associations, that as a rule the county associations are in good standing financially; they have quite good balances on hand, and I find that by the earlier records of the associations and by the constitutions and by-laws that one of the purposes of the Ontario Bee-keepers' Association in giving grants to the County Association was that they should assist in putting up honey exhibits at the local fall fairs. Now it seems to me that this subject is very opportune and should be taken in by the representatives of the county associations and taken to heart and the county exhibits at the fall fairs might well be increased and strengthened after this discussion.

Mr. Anguish: Mr. Sibbald first started by advertising. We all know we have got to advertise in some way, as he said before, unless we bee-keepers can be as influential as the fruit growers have been this year and get the Government to take it up when we have a big crop and help us out. I do not know whether we can or not but they have succeeded and they have made a wonderful success. You can hardly get apples in our county now and we had a big crop. What was the cause of it? It was advertising did it. If it had not been for advertising those associations would have mostly all their apples on their hands yet. We know the north-west is in bad shape. And we have got to get at it ourselves, and we have been doing it by advertising at the exhibition here in Toronto and several other exhibitions around through the country. The gentlemen who have spoken have taken two different views of this exhibition. They have said you must have some outstanding feature, some one particular thing to draw the people's attention such as a great big pyramid in the centre and nothing else. The gentleman who said that is all right as far as he was concerned, and the kind of exhibit he was putting up, and what he was putting it up for. He was putting it up for the Ontario Bee-keepers' Association and he was getting his pay for putting it up. He was going to derive no revenue from it for the sales he would make because he could not sell any at the exhibition. When we are selling honey we ought to have something to draw everybody's attention, even live bees; honey built in glass and all these things help to attract when you are selling honey, but when you are not selling of course that is a different problem. Last fall the Association put up as creditable an exhibit as could be put up, but I notice they had a whole lot of that glass, and whether it is my fancy or not it pleased me.

Mr. Couse: At Cooksville a year ago there were perhaps fifteen to twenty prizes for honey, and there were perhaps two tons of honey in that little place. They piled

it up so high that it fell down. You know there was a glut or a large quantity of honey all through the section of country where that exhibit was put up. We put some up in glass, and were rather criticized for doing that, because the unfortunate thing is that in these little exhibitions we are too selfish. I sent my boys there and told them they could sell the honey, and make a profit on it to the amount of the prizes. Some of the older men did not want these boys to get prizes, and told them they should not put it up in glass. That is one thing it is hard to get away from, and that is this selfishness at fairs. When there is a rule at a fair it is a hard thing to keep bee-keepers from breaking it. We had to make our rules a little more lenient, because some of the best exhibits have got to stay out for that reason. Out of that two tons of honey at Cooksville every pound of it was sold readily. That shows that it really creates a demand for it. I was driving through Oakville not very long ago, and you know how apples have been advertised in that section in particular, and I could not understand how every child I met on the street apparently coming home from Sunday School had apples. I do not know where they got them. Mr. Grainger talked about putting up an exhibition in a man's window, and then losing his trade. That did not cost him very much. In a hotel I frequently stop at, I found they had no honey on the bill of fare. I asked the manager why, and he said it was too expensive. "Comb honey, costing what it does," he said, "we can't put it on. We have tried it." I said, "Why don't you put on extracted honey, and then you can afford to put it on." He did not think he could do that. I said, "I will tell you what I will do, I will send you a sample of good honey and you can try it." I sent him ten or twenty pounds of honey. He has had honey on that bill-of-fare ever since, but I never sold him a pound of honey. But that shows when you go at a thing you can accomplish something. I would not be surprised that that hotel has perhaps used a thousand pounds of honey since they put it on the bill-of-fare. In Europe I think almost every hotel has honey. It is not the case in this country, so that it is up to us to do all of that kind of thing we possibly can.

No doubt bees at exhibitions are very attractive, and I would certainly have live bees at the fair from the fact I remember at the Pan American Exhibition, Mr. Herschiser was in charge of the New York State Exhibit, and you would see people run right past the honey to where the live bees were. They were without doubt a most attractive feature. If you can attract people past some other exhibit to live bees you will attract them.

MR. NEWTON: We would have probably fifty people in a day at the Pan-American ask, "Where are the bees?" and they would frequently go past our exhibit, and go to the New York State Exhibit because they had bees working and they had been advertised.

R. C. FRETZ, Forest: We have in Lambton County this year organized an association that has its value to the local fruit, vegetable and honey associations in the county, and we have had co-operative exhibits. They put up prizes for non-competitive exhibits, and these prizes amounted up to hundreds of dollars, and the individual or an association could show, and the object of the exhibits were to be commercial exhibits, not to carry out the idea of being artistic so much as to put in a commercial exhibit, to have a large quantity to attract buyers, and I believe if this could be carried out at our larger exhibitions it might do a lot of good, it might help us a great deal in our selling plans. I just offer these suggestions as they occur to me.

I would like to ask Mr. Grainger a question or two about decorations. What kind of decorations do you use, Mr. Grainger, in the colors of your bunting, what would suit the extracted honey in glass best, and whether or not it is good to use very much bunting and where?

MR. GRAINGER: I think the most of the exhibitors will agree with me when I say a background is always important and I would say yellow and white for honey are about the best colors you can use. It seems to blend in with the honey and make a good background. Of course green is always good; you can use that without making a clash of color, but the old idea of putting all colors of the rainbow mixed up in it is a thing I think is not good taste.

## QUESTION DRAWER.

(Conducted by MR. ARMSTRONG.)

Q.—Would you advise a beginner to start with pound packages or full colonies?

MR. ARMSTRONG: I would say full colonies for a beginner every time.

Q.—What makes the best wall for a bee cellar, brick, stone or cement?

MR. ARMSTRONG: I would say cement because you get a more perfect wall. You take a stone wall and perhaps you have a large stone running all through the wall. Frost would penetrate that wall very easily, and perhaps you have in between the stones a space of six or eight inches, and the mason sometimes has a way of plastering things over on each side of the wall; they face it up and the centre is all open and it is not a solid wall. If you have a cement wall you know you have a solid wall.

MR. PETTIT: A member of the Bricklayers' Union told me a few years ago in speaking of this very subject that if he were having a bee cellar built he would have it of cement. He says as a matter of fact it is the practice of the majority of bricklayers to put a line of mortar around the outside and leave all kinds of hollows in between the bricks. The only way, unless you are actually doing the work yourself, of getting a wall that is uniform is to build it of cement where the stuff is dumped in and packed down.

MR. ARMSTRONG: I think yet that there is no wall as perfect as a solid cement wall. You may have as many spaces in it as you like, the more spaces the dryer. For a house I would say that the more spaces you have the dryer will be your wall. If you are building a cellar with cement blocks I would always have them made by a facedown machine, then you can have the surface as hard as you like, you can make it stronger and you can put more cement in, and you have got a wall that no water will penetrate. In most of the blocks they make they are too poor, they don't put enough cement in.

MR. PETTIT: What proportion would you make them?

MR. ARMSTRONG: The most of them are one to seven and that is not enough cement. You see a great many houses put up and after a rain they will be wet for two or three days, and if you have them made with a face down machine and make your face not more than half an inch of strong cement the water will not penetrate it.

Q.—Is it necessary to dequeen before allowing a queen to run in?

MR. ARMSTRONG: I would think so. If I did not I always found it a failure.

Q.—Why was there such a light flow of nectar secretion this year?

Mr. Armstrong: In our locality it was the cold nights. It is the same way with buckwheat as with clover.

Q.—What is the biggest problem before the Ontario Bee-keepers' Association at the present time and what steps are being taken to meet it?

Mr. Armstrong: The biggest problem I think is the foul brood question. I think we are now doing nicely along that line. The Minister of Agriculture wanted to know if there was any progress made. I would say I am satisfied that there is progress and good progress made with American Foul Brood; I cannot say about the other. My reason for saying that is that when I first started out it was an everyday occurrence nearly to find fifty to seventy-five or one hundred and fifty empty hives piled up in a man's yard. For the last three years I have never seen anything like that, so I think the bee-keepers are getting educated along that line as far as American Foul Brood is concerned.

Q.—What is the best way to get hives of bees from Ontario to Alberta?

Mr. Armstrong: I never ship them as far as that. I have shipped them to the eastern provinces. I would say as soon as it gets warm enough I would screen them top and bottom and if I was sending out a carload or half a carload I would see to putting them in the car myself and see them started off, and give them plenty of ventilation and send nothing but strong colonies and plenty of stores.

Q.—Do bees store honey in worker comb in preference to drone comb and will they crowd the worker comb full and leave the drone comb empty?

Mr. Armstrong: Yes, I think they will. I have always had a queen excluder on and in some of my extractor comb there is drone comb. I have seen these supers with the honey nearly all sealed and there would be a patch of drone comb right up there and there would not be a particle of honey in it, simply holding it for the queen to lay in.

Q.—What would you think about encouraging customers to use honey in cooking by giving each customer a receipe book with every ten pound pail?

Mr. Armstrong: I think that is a very good thing. I have practiced that somewhat myself and I think it would be all right.

Q.—Is it a good idea to put a few sheets of newspaper on top of a cloth and place on a tight fitting cover for wintering?

Mr. Armstrong: I have taken covers off and placed papers over. I don't quite see the object of putting papers over and then putting a tight fitting cover over, but I think it is a very good plan if your quilts have had holes knocked in them, and are used like this, when you can't buy new ones, to take newspapers and put over them. I do not care how many you put over. I generally put the cover in on top of the packing, but I take particular care that I raise one end of the cover and my packing so that there is a little ventilation underneath. If you lay it right down on the packing the moisture comes up and strikes the cold cover and then condenses there.

Mr. Pettit: What sort of packing are you referring to?

Mr. Armstrong: Sawdust, leaves or chaff or planer shavings; it won't show so much with leaves, but you take anything that is close and dense like sawdust and planer shavings and you will always find if you put the cover down flat, towards the middle of the winter or during a heavy frost, a certain amount of that sticking to the cover.

Mr. Angle: Would you recommend using sawdust as packing?

Mr. Armstrong: I have used it for the last thirty years and over—sawdust and planer shavings together, oat chaff or wheat chaff—but I do not like red clover chaff at all; it does not seem to stay at the same temperature. If you pack bees with red clover chaff so that when each entrance is four or five feet apart, one facing one way and another the other, you will find during some winters when the weather is just right for that kind of thing that the bees are clustering out at the entrance. I have had them cluster out in January with that kind of packing and they would stay there for a whole week and that colony would not be much good in the spring. I removed the packing and it removed the trouble.

Mr. Newton: This is a very important question and we could not do it justice at this time. With regard to the packing it all depends on the entrance. If you have a small entrance you could not shut them down tight without causing damage, but if you use a large entrance you could shut them down without that moisture, but it is too large a question to discuss in a few moments.

Q.—Would you find any serious difficulty in using moist shavings or sawdust?

Mr. Armstrong: I would not want to use it at all.

Mr. Sibbald: Perhaps you never tried damp shavings. I had the idea they should be very dry, but the first year I could not get clean dry shavings and I had to take quite green shavings from the mill and I was surprised to find they were very dry in the spring and that they hadn't had any bad effect on the bees at all. In fact it seemed to me they had dryed out there from the heat of the colony.

Mr. Armstrong: They certainly will dry out.

Mr. Krouse: You wouldn't find that with the sawdust.

Mr. Sibbald: It is perhaps not so safe to use damp sawdust.

Mr. Armstrong: I wouldn't advise using any damp packing if I could get the dry; I do not quite agree with our friend Newton. About the entrance, I have not seen any difference. I know there is a bee-keeper not far from me that used a very small entrance in winter, sometimes not more than two inches by three-eighths, and he packs his bees just the same, and he finds the same difficulty I find in mine. The entrance in my hive is four and a half inches by three-eighths.

Mr. Newton: That is not big enough for having them solid on top.

Mr. Armstrong: I am quite a way south and I find it big enough. I have tried a seven-eighths entrance but I found the difficulty I had then was the deer-mice in winter; they would go in the entrance and destroy some of the colonies.

Mr. Newton: Make it the full width of the hive.

Mr. Armstrong: I have tried that. The only difference I could see was that when it came a heavy storm I would find the snow would blow clear in to the combs and up under the combs in some of the hives.

Q.—How much packing would you advise between the top of the hive and cover?

Mr. Armstrong: I like to have about six or seven inches. It makes a great difference what kind of packing you use? Two inches of fine sawdust that comes from the planing mills would amount to as much as six or seven inches of leaves or cornchaff.

Q.—What about cork chips?

Mr. Armstrong: I have never had any experience along that line. I intended to try it. I went down to Port Colborne to the factory where they handle cork

and I intended to try it but I have never done so yet. I think it would make a good packing.

MR. KROUSE: I might say I have tried it in a small way, and getting larger all the time for five years, and it is the best packing I have; it is always dry.

MR. ARMSTRONG: If the grain is one-eighth of an inch square they work that over, they make it into brick for floors, but they have some that is finer than that, getting down to pretty near dust, which they offered me for twenty dollars a ton.

MR. KROUSE: They sent three samples and the fine sample I wouldn't recommend, but either of the other two was all right.

MR. HABERER: What about cut straw?

MR. ARMSTRONG: I never tried cut straw, but I helped a man to fix up his apiary this fall and he nearly always uses cut straw.

MR. HABERER: I prefer cut oat straw to wheat straw and I think it makes as good a packing as the chaff. In one way I like it better, it is a little cleaner to handle. It is cut about an inch long.

MR. GRAINGER: I have used cork; I get it from the storekeepers.

Q.—How would you advise wintering bees in the cellar? What covers would you have on them?

MR. ARMSTRONG: Don't have any covers in the cellar at all; I very often take the covers off. What he put on top was the super and he dropped a cushion right in on top made out of chaff and coarse sacking.

MR. EVANS: I will guarantee to winter every hive that goes into the cellar in proper shape and I want the quilt sealed perfectly air tight, and I want the bottom sealed tight. I have a strip of an inch at the bottom board so that there is an inch between the bottom of the frames and the bottom board except at the front, I had that nailed on with staples and I want that glued tight. I object altogether to the loosening of the bottom or top board when it is put into the cellar. There is where spring dwindling comes in. I pile them up five high and when I take them out I won't find any spring dwindling.

MR. ARMSTRONG: That answers the whole thing. If Mr. Evans can winter every colony that goes into the cellar we don't want anything better than that.

MR. EVANS: I can winter every one that goes into the cellar properly.

## SOME EXPERIENCES OF THE SEASON OF 1914.

O. L. HERSHISER, BUFFALO, N.Y.

### THE MAN WHOSE HONEY GAVE HIM A PANIC.

Once there was a bee-man who got a bumper crop of honey. At first he was happy and had visions of wealth, but when he read in the papers that nearly all who kept bees had bumper crops also, some much larger than his and that the land flowed with it as well as with milk, he was alarmed. He cried, "This is more sweetness than the people can eat. Surely this business has been overboomed for bee-men have suddenly become as the sands of the sea in number, and honey will deluge the land. Our hives and bees will avail us nothing henceforth." And straightway he "went to it" and sold his bumper crop for a sum not greater than he had received for meagre crops in other years: for many other bee-men thought likewise. Honey was fairly thrown at the buyer and was easy of purchase for the offerings were many and great.

But the following season was a lean one, and as the last prospect for a honey crop faded away and orders had to be refused, he soliloquized; "Last season I received little better than a song for my bumper crop and demoralized my market and this year I have little to sell. Bees and bee-men do not now seem too numerous and especially honey not too plentiful. The honey flood has subsided and I calculate that last season's and this season's crop amount to not more than an average for the two seasons. If I had carried over to this season such part of last season's crop as could not be sold at a fair price I would have realized handsomely for all of it and be "bones and beans" ahead. But I let that bountiful gift of nature slip away from me for nearly nought: "Good Night!"

*Moral*: Don't get a panic when you get a good crop of honey and sacrifice it for a trifle, but "bide a wee" until supply and demand are normal.

The above fable illustrates one experience common to many bee-keepers for the seasons of 1913 and 1914. But a few who do not attribute the bumper crop of 1913 especially to the efforts of colleges and bee-keepers' associations to make better bee-keepers, but rather as a phenomenon not likely to recur the second consecutive season, are enjoying the average returns from their apiarian investments by reason of the honey carried over from last season.

### The Disastrous Effects of an Unusual Snowstorm.

To the north of an apiary and about 150 feet distant, is a railroad embankment, about 12 feet high, which would seem to furnish ample protection from wind and drifting snow from that direction. Some 700 feet to the west are houses and trees, and immediately to the west is the honey house and other artificial wind-break. Along the south side is a wind break of old hives five feet high.

During the latter part of February last we experienced a fall of several inches of dry, light snow accompanied by a brisk north-west wind that, notwithstanding the supposed protection, drifted the snow not only around the hives but into them, filling every space between and to the very top of the combs and enveloping the cluster of bees. When first looked over, four or five days after the storm, 75 colonies out of 108 contained live bees ranging from a handful up to strong colonies. Very soon they dwindled until 43 remained nearly all of which dwindled to very weak nuclei, and 13 of which eventually became queenless. The blanketing of snow seemed to take the vitality out of those colonies that survived the immediate effects, and colonies that on first examination seemed amply strong soon dwindled badly.

The colonies were normally strong in the fall when put up for winter. About one-third of them were in double walled hives, well packed above, a part of the remainder in single packing cases, a few in cases containing four colonies each and four colonies in single-walled eight-frame hives drawn into a cluster and each packed with an extracting super full of packing. There was no noticeable difference in the wintering by the various methods except that three out of the four eight-frame hives came out much stronger than any of the others which may have been due to their location near the honey house and being better protected from the wind.

Another apiary of chaff hives on the south edge of a bush of tall second growth, with a large neglected orchard immediately to the south, wintered 101 strong colonies out of 105 and another apiary similarly situated, with a slightly greater percentage of loss. The latter of these apiaries was packed in clusters of four except about one third which were double walled hives.

It is evident that hills and embankments do not always furnish proper protection from wind and snow, and that the effectiveness of artificial wind-breaks may often be over estimated. Also that they often induce strong currents of air where least expected as is shown by snow drifts and clean wind-swept ground in apparently well protected places.

My experience is that orchards and second growth bush furnish the ideal protection from wind and snow-drifts and that hills and embankments cannot be depended upon.

### Entrance, or No Entrance, to Hives for Winter.

Various sizes of entrances to hives, for successful wintering, have been advocated. Those advocating the sealed cover, so called, want a large entrance or the full summer entrance. Those advocating absorbents above the cluster, instead of the sealed cover, seem inclined to the belief that it is desirable to have the entrance more or less contracted to insure best wintering. In all cases ample room for the bees to fly on warm days is advocated.

Contrary to any thing I have read on the subject, and at variance with any previous experience, a small apiary came under my observation last spring where the entrances to the hives had been closed with wire cloth, (the kind used in making fly screen). This was done to exclude the mice but it also *included* the bees. In addition to the protection from mice furnished by the wire cloth, protection from the wind from the west was provided for by leaning a board up in front of the entrances of the hives facing westward. The hives were packed in the usual manner, in packing cases, except that in one particular case there were eight colonies. They were unpacked late in April after the weather had been warm enough for flights on several days.

The remarkable thing about this occurrence was that every colony in the apiary, fifteen I believe, were alive and nearly all in very excellent condition, although one colony was wintered on four combs and another on five. One of the stronger colonies had the entrance closed with dead bees from within, in addition to the wire cloth, in such manner as to practically exclude the air. Over the cluster was a quilt of burlap and above this a packing of forest leaves through which, of course, there would be a slow circulation of air.

Question for discussion, in view of the above described occurrence:

Is any entrance to the hive in winter desirable or necessary? If necessary, how much?

### Introducing a Queen by Throwing Her at the Colony, After Other Method Had Failed.

Important discoveries are sometimes made by accident and, in despair, unusual methods are occasionally employed, not with any particular expectation of success, but because approved methods and treatments have failed and there appears to be nothing else to do. Thus, accidentally, was introduced a queen to a very stubborn colony, by a method not heretofore tried by the writer.

A strong colony was made up of hatching brood and a capped queen cell given, which was destroyed. A second queen cell met with a like fate. An attempt to introduce a laying queen by the wire cloth cage plan resulted in failure. (This method is the caging of the queen with young worker attendants from the colony to which the queen is being introduced, in a wire-cloth cage, on the side of

a brood comb and kept so confined, with the colony for from 24 to 48 hours before releasing.) After the colony had rejected the laying queen the presence of fertile workers was discovered, and the colony was treated by shaking the bees from the combs at the distance of 75 to 100 feet from the hive and giving them two more frames of brood. A second attempt was made at introducing a laying queen by the wire-cloth method which failed. I had a dark, but otherwise desirable queen, that had been caked and kept for a possible emergency for about three weeks, and when I experienced the second failure at introducing a laying queen I determined to try this one. But, upon examination, I found her attendants all dead from starvation and the queen so weak she could hardly move. I thought it not worth while to try to introduce her as she appeared to be almost dead. However, I opened the hive and dumped her on the center of the cluster, gave a puff or two of smoke on the top and at the entrance and left her to her fate.

She was accepted and now heads a good colony.

Is this the starvation method of introducing queens?

### An Important Experience in Which I Trust All of You Share: Hope.

The past season has come about as near to being a failure, with many of us, so far as the honey crop is concerned, as has come within the memory of the present generation of bee-keepers; but he lacks in wisdom who does not earnestly endeavor to rescue something of success out of failure. If you have kept your apiaries up to full productive strength you have embraced a golden opportunity. If your bees are still short of winter food a golden opportunity is still yours, for feeding is practicable, even in winter and in the cellar or out of doors. The late summer rains came in time to save the clover for most of us and, we hope, in time to cause the bass-wood and fruit tree buds to set for next seasons fruiting. With these fair propects you cannot but indulge the hope for a good honey crop next season.

May your best hopes and expectations now, as the year 1914 draws to a close, be realized in the experiences of 1915 and henceforth.

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## THURSDAY AFTERNOON.

Mr. John A. Lunn, Fingal: Taking the average crop in three or four years, we do not find that there is much difference in the end. I believe it is the law of averages that we very seldom get a large crop two years in succession. This seems to be the lesson to be learned, that it would be a wise thing to hold the honey crop two years in succession. This seems to be the lesson sometimes, rather than sell it at a sacrifice. We all had an overflow of honey last year. Some found it difficult to get rid of it. Personally I was not one of those who sold for a low price. Still I know of many who sold for very much less than what they could have got for their honey. They could have borrowed money, if necessary, so as to keep their honey over until this year, when it would have sold very readily. In our district we cannot pretend to supply the demand.

Another point was the closing up of the entrance of those few colonies. A few years ago when I first started bee-keeping my first colony was in a box hive from a runaway swarm. The entrances were two inch augur holes. When the winter came, I nailed some screens over the entrance, and built a shock of corn around the colony. I let it stay until the snow was gone. They wintered per-

fectly, as well as I could wish, and cast a very large swarm on the 24th of May. The size of the hive was 8 inches square and 30 inches high. They cast about as large a swarm of bees as I have ever had anything to do with. Possibly it might not hurt the bees to be confined if they had air enough to keep them going. Of course, there was no chance for the entrance to become clogged up. It was six or eight inches away from the bottom of the hive to where the bees were confined.

Another thing that was mentioned was about putting in that queen, when it was about dead. That was brought out to show that sometimes the queen might be accepted by the starvation plan, but I am not prepared to say that I would want a queen that was starved until she was pretty nearly dead. I wouldn't want a colony headed by a queen like that. A colony of that description I would simply destroy. However, that is a question for discussion afterwards.

Mr. Herschiser had poor luck with one of his yards last winter. I live in Elgin County, down at the lake. It is what you might call the garden of Ontario, and we have a much warmer climate than you have here. Our President told me to-day that they had several days last winter that ran to thirty degrees below zero. We only had two days last winter that went either one or two below zero. Although we quite often get a little lower temperature than that, still we do not get anything like such severe cold weather, and the winter problem where I am situated would not be anything like what it is with you. Our bees wintered as near perfect as it would be possible to get an average yard to winter, and came through very strong in the spring.

I don't practice stimulative feeding. They were strong enough on the 15th of May for me to find it necessary to give them a second brood chamber of ten frames to keep them from swarming. It was the earliest I ever found it necessary to do that. I did it with about a third of my colonies.

Now, about the feeding of artificial pollen. Each year I am more and more inclined to think it is a good move. I started several years ago. Although it may not stimulate the bees very much, I think it has the effect of keeping the bees from wandering to the woods, perhaps too far away, and not getting back.

A new experience for me was the moving of bees. This is the first year I ever attempted to move bees. I started out with quite a little misgiving, as I had read what different men had described about moving bees, how difficult it was to do so, how careful a man had to be, and no matter how careful you might think yourself mighty lucky if the bees did not get out and sting your horse so as to cause a runaway. However, we moved the two loads of bees one night. We started about eight o'clock in the evening and finished at six. We got through without being stung ourselves or having any trouble whatever. To me the moving of bees looks like a very easy thing, if you have hives that are bee tight.

I remember seeing a man move his bees some years ago, and you could see the combs from about four sides of his hives by looking in. He was moving in the day time, and as near as I can remember he did not try to stop all the holes. He did not have blinkers on his horse. He did have a smoker going. Outside of that he was getting along. If you can move bees that way, I do not think a beginner need be afraid.

I do not know what success the bee-keepers have had in the raising of bees this year. I admit that I was beaten. Almost all the queen cells were undersized. It didn't make any difference whether I tried to start artificial feeding or whether there was a flow on I could not raise queens satisfactorily to myself. It must have been the cold winds, but I had great trouble in raising what queens I needed, and some of them are not satisfactory.

An event that was of importance to us as bee-keepers was the magnificent flow we had in the fall. It is very seldom that we get a very large flow in the fall, but this year we did have a magnificent flow and it put the bees in fine shape for winter. There has been quite a lot of talk about the kind of weather that causes the honey flow, or brings it about. Some say that it is the cold nights that stop the honey flow, and a good many think it is the frost in the spring. I do not think cold nights or frost in the spring have anything to do with it. It is connected with something in the atmosphere at the time the flowers are in bloom. I had a hive on the 6th of June. The weather was warm. The first day they gained three pounds. Our nights were cold all the time. The next day was a cold day and we didn't have a gain for three days. In fact, there was one pound less. Then we had a warmer day and we had a gain of two and one-half pounds. The next day the wind was at the north and the night was very cold, and the next day at 10 o'clock in the morning it was a warm day. At noon the scales were balancing. It was muggy right in the centre of the clover, and at 7.30 at night there had been a gain in that colony of thirteen and one-half pounds. That was the only gain we had during the whole clover flow that was worth anything at all. By the next morning they had shrunk to two pounds. The next day was still bright, but windy. That night was warm, but the next day it turned out windy and we did not get any honey at all. The wind went to the north and the next night was cold. The following day it brightened up a little and we got three pounds.

MR. PETTIT: I wish to hold out a very strong warning with regard to the moving of bees. It is one of the most dangerous operations that a bee-keeper can take hold of, particularly if you are using horses. There is the danger of losing horses and, on the other hand, the danger of losing human lives. We cannot be too careful, not only for the safety of the bees, the safety of the horses, but also the safety of the man in charge.

MR. EVANS: I see the subject under discussion is the experiences of 1914. I will give you my balance sheet:

Number of bees in spring of 1914..... 183
In fall of 1914..... 177

Expenditure.

| | | | |
|---|---|---|---|
| Frames, freight, etc..... | $22 38 | Duck ..... | $ 2 60 |
| Teaming and empty cans..... | 2 00 | Wages ..... | 73 00 |
| Material for 100 hive bodies and 50 hive lids..... | 40 00 | Sugar..... | 133 00 |
| Taking out bees ..... | 2 00 | Total expenses ..... | 307 22 |
| One hive ..... | 6 00 | Wax sold ..... | 57 60 |
| Painting ..... | 7 53 | | |
| Making up foundation..... | 17 34 | Deficit ..... | $249 62 |
| Express ..... | 1 35 | | |

On hand 1,500 lbs. of honey dew which cannot be sold. (Laughter.)

THE PRESIDENT: Mr. Evans' balance sheet probably comes under the head of "This Year's Experience." Very many of us could duplicate it.

A MEMBER: With regard to the late honey crop this year. I was listening recently to a lecture given at the County Buildings at Sarnia, by a Professor from Guelph, and he said that last year had been the driest year that we had for thirty years. We had had five inches less rainfall. I wondered if this would make a difference, and that there might be some connection between that and our late honey crop this year. These figures were compiled from between the 1st September, 1913, and the 1st September, 1914.

We had a little experience in regard to moving bees this spring. We moved the bees thirty-two miles and we had fifty colonies. We got a motor truck and put the whole business on it. We moved them out without any trouble. It took us about four hours to do it.

MR. HOLMES: During the discussion a reference has been made as to the probable cause of the absence of honey secretion during the season. While I am not a scientist, I draw this conclusion: In my county, in the far east yonder, while the clover was all right, the meadows were good, yet we had climatic conditions, the extreme—I call it freakishness—when we had three or four days of intense heat, that dry, burning heat that would seem to just wither vegetation, and immediately following that we had the other extreme, three or four days of a temperature when you would require an overcoat when driving. Of course, the bees, not having overcoats, found it impracticable to go to the fields and there was no honey secretion. I attribute to this peculiar climatic condition the absence of honey and flowers.

F. W. L. SLADEN, Ottawa: With regard to queens that are starved until they are almost motionless before introducing, I have found in some cases that they become moribund. They may be apparently all right.

This question of the effect of weather upon secretion is, I think, a very important one. The investigation of that would be much easier if observers would make a few weather records every day, beginning, say, two weeks before the clover. Give the minimum and maximum temperature at night and the temperature at noon. They are not always exactly the same. Then the force of the wind, and another important fact is the rainfall during the several weeks previous to the flow, and right through the clover blooming. If we had figures we could know where we are. When an observer mentions the weather has been cold and muggy, you don't know what he means.

I believe clover is affected very much by moisture and heat, and we want to know just how it is. If those simple records are made by a number of observers daily, it would be a pleasurable work for anybody and this question can be more easily investigated.

THE PRESIDENT: In connection with this queen being accepted, I have an idea she would be accepted every time. It is simply an aggravated form of starving. I doubt whether it would be a profitable plan to pursue in the end.

I wish to emphasize what our Secretary said about moving bees. I have moved bees in all sorts of ways, and while I have never had any accident I always heave a sigh of relief when I get through. It pays to be careful. While I am in a waggon I want to plug up all hives and to see that no bees get out after I start. An excellent thing to carry along is a roll of cotton batting.

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## REPORT OF THE SECRETARY FOR 1914.

The total number of memberships in the Ontario Bee-keepers' Association received during the year ending October 31st, 1914, is 1,284, compared with 1,404 last year.

Four hundred and sixty-nine of these members came in from affiliated societies and the balance of 815 by single subscriptions.

The fact that only 120 members have fallen away in this year of hard times and crop failure is very encouraging, especially in view of the 875 increase a year

ago. All those new members would not renew at the end of the first year for reasons of sentiment, but because they are getting their money's worth.

The increase from 50c. to 75c. required from members coming in through the affiliated societies does not seem to have made any material difference in the number of members so received.

Two new county associations, Carleton and Essex, have been formed, but unfortunately one of the oldest Norfolk, also two of the newer ones, Hastings and Frontenac, have been dropped from affiliation for lack of the required ten members who are also members of the Ontario Bee-keepers' Association.

The affiliated associations with their members are as follows:—

| | Members | | Members |
|---|---|---|---|
| Brant | 15 | Lincoln and Welland | 35 |
| Carleton | 13 | Middlesex | 30 |
| Elgin | 38 | Northumberland | 14 |
| Essex | 18 | Oxford | 10 |
| Glengarry | 10 | Peterborough | 11 |
| Grey | 14 | Prince Edward | 14 |
| Haldimand | 10 | Russell | 13 |
| Halton and Peel | 23 | Simcoe | 19 |
| Huron | 19 | Stormont | 10 |
| Kent | 16 | Victoria | 30 |
| Lambton | 19 | Wellington | 29 |
| Leeds | 14 | Toronto | 11 |
| Lennox and Addington | 17 | York | 17 |

The queen order business was continued during the year. Two hundred and forty-seven members purchased 2,143 queens at an average price of about 70c. each. This will be continued next year.

The war situation in August brought on a serious menace to the bee-keeping industry in Canada owing to the difficulty of securing sugar for winter feeding. The secretary sent a letter to the members of the association advising them to communicate with their representatives in the Dominion Legislature urging some special provision for bee-keepers under the circumstances. The subject was debated in the House, and was referred to Sir Geo. E. Foster, Minister of Trade and Commerce, who wrote to the secretary asking for a statement of the bee-keepers' needs. A second letter was then sent to the members and about 100 replied, stating a total requirement of about 48,000 lbs. of sugar for winter feeding. The addresses of those making application were sent to Sir Geo. Foster, with a statement of their requirements. He very kindly sent these lists on to the sugar refiners, who in turn sent them to their local agents throughout Ontario, instructting them to see that *bona fide* bee-keepers were supplied with plenty of sugar at wholesale rates.

Acting as Provincial Apiarist, the secretary took a spring report on bee-keeping, sending blank forms to a large number of Ontario bee-keepers the latter part of April. One thousand one hundred and fifty replies were received, reporting 38,222 colonies spring count. The average winter loss was only seven and one-half per cent., and prospects for a honey crop very bright. The reports taken later, however, show almost a total failure of the honey crop.

Upon motion the report was received and adopted.

The Treasurer's report was also received and adopted.

## REPORT OF THE CROP COMMITTEE.

The Crop Report Committee of the Ontario Bee-keepers' Association met on Friday, July 31st. Five hundred and fifteen members reported from all parts of Ontario, showing an average of 16 lbs. per colony, as the average in 1913 was nearly 100 lbs. per colony, it means that the honey crop this year is almost a total failure, except in a few of the counties. There is, however, in the hands of bee-keepers and dealers quite a quantity of last year's honey, which, if it has been properly cared for, should be in good condition for this year's use.

The prices recommended by the Committee are as follows:

No. 1, light extracted, wholesale 11c. to 12c. per lb.
No. 1, light extracted, retail, 14c. to 15c. per lb.
No. 1, comb, wholesale, $2.25 to $3.00 per doz.
No. 2, comb, wholesale, $1.50 to $2.00 per doz.

These prices are f.o.b. in 60 lbs., 10 lb. and 5 lb. tins; the former being net weight with the tin thrown in, the two latter being gross weight. The difference in time and trouble of filling the small tins should equalize the price. In selling to the wholesale merchant the lowest wholesale price should be asked; while the retail grocer should pay the highest wholesale price. The retail price to the consumer might vary according to the quantity he takes in any one purchase and whether he supplies his own package.

These prices are, of course, only for first class honey. Any honey which shows much color or is at all off in flavor would have to be sold at a lower price; 1913 honey which shows any signs of fermentation even by a slightly sour smell when the can is first opened, or where it has been partly liquefied through summer heat, should be thoroughly liquefied before it is sold. Members purchasing honey to supply their home customers should be very careful not to buy from infected apiaries.

### WHITE HONEY CROP REPORT.

Ontario Beekeepers' Association, Guelph, August 1st, 1914.

| County. | Number of Bee-keepers Reporting. | Number of Colonies Reported —Spring Count. | Number of Pounds White Honey.* | Average Number of Pounds per Colony —Spring Count. |
|---|---|---|---|---|
| Algoma | 1 | 52 | 2,100 | 40 |
| Brant | 11 | 640 | 7,960 | 12 |
| Bruce | 12 | 645 | 6,200 | 10 |
| Carleton | 10 | 337 | 14,533 | 43 |
| Dufferin | 5 | 225 | 3,000 | 13 |
| Dundas | 3 | 167 | 3,550 | 21 |
| Durham | 6 | 473 | 50 | ..... |
| Elgin | 22 | 919 | 19,532 | 21 |
| Essex | 5 | 106 | 6,200 | 58 |
| Frontenac | 8 | 415 | 8,900 | 21 |
| Glengarry | 3 | 157 | 4,400 | 28 |
| Grenville | 4 | 113 | 200 | 1 |
| Grey | 17 | 1,099 | 15,120 | 14 |
| Haldimand | 10 | 419 | 10,850 | 26 |
| Haliburton | No report. | | | |
| Halton | 10 | 1,239 | 3,550 | 3 |

WHITE HONEY CROP REPORT.—Continued.

| County. | Number of Bee-keepers Reporting. | Number of Colonies. Reported —Spring Count. | Number of Pounds White Honey.* | Average Number of Pounds per Colony —Spring Count. |
|---|---|---|---|---|
| Hastings | 10 | 227 | 6,600 | 29 |
| Huron | 18 | 1,419 | 11,850 | 8 |
| Kent | 8 | 320 | 12,424 | 36 |
| Lambton | 6 | 3,396 | 21,712 | 6 |
| Lanark | 8 | 569 | 11,520 | 20 |
| Leeds | 10 | 720 | 15,040 | 21 |
| Lennox | 7 | 212 | 1,450 | 6 |
| Lincoln | 14 | 1,463 | 32,275 | 22 |
| Manitoulin | 3 | 57 | 1,250 | 22 |
| Middlesex | 32 | 2,473 | 58,904 | 22 |
| Muskoka | 3 | 63 | 406 | 7 |
| Nipissing | 3 | 14 | 610 | 44 |
| Norfolk | 8 | 266 | 5,584 | 21 |
| Northumberland | 11 | 433 | 10,900 | 25 |
| Ontario | 12 | 597 | 1,350 | 2 |
| Oxford | 15 | 739 | 20,150 | 27 |
| Parry Sound | 1 | 16 | 700 | 44 |
| Peel | 12 | 1,074 | 6,430 | 6 |
| Perth | 16 | 635 | 29,278 | 44 |
| Peterboro | 9 | 173 | 600 | 3 |
| Prescott | 7 | 918 | 30,700 | 33 |
| Prince Edward | 8 | 189 | 1,900 | 10 |
| Rainy River | No report | | | |
| Renfrew | 4 | 346 | 19,650 | 57 |
| Russell | 5 | 247 | 4.700 | 19 |
| Simcoe | 32 | 1,780 | 14,990 | 8 |
| Stormont | 6 | 530 | 4,850 | 9 |
| Thunder Bay | No report | | | |
| Victoria | 21 | 913 | 4,360 | 5 |
| Waterloo | 6 | 149 | 1,600 | 10 |
| Welland | 22 | 742 | 24,574 | 33 |
| Wellington | 24 | 899 | 7,780 | 9 |
| Wentworth | 13 | 1,046 | 40,010 | 39 |
| York | 34 | 2,125 | 4,972 | 2 |
| Totals | 515 | 31,786 | 510,264 | 16 |

* A small percentage of the honey reported is sold in comb honey sections. As a colony managed for comb honey will produce about half as much as one managed for extracted honey, the Committee has multiplied the number of pounds of comb by two before adding in with the extracted.

## DARK HONEY CROP REPORT, SEPT, 12th, 1914.

The Crop Report Committee of the Ontario Bee-keepers' Association met on Friday, September 11th, to consider the Crop of Dark Honey. It was found that 198 members had reported 89,568 lbs. from 131 colonies, being an average of less than 10 lbs. per colony. This is less than half of last year's average. The committee advises members to ask 7½c. to 8½c. per lb. wholesale, depending on the size of the package and the quantity sold in one order. No buckwheat honey should be retailed for less than 10c. per pound.

The white honey market is quiet just at present, and owing to the uncertainty of all market conditions on account of the war it is difficult to advise. Owing to the general failure of the honey crop, both light and dark, the stock of honey in

the country is steadily diminishing and it will be many months before another harvest time. Meanwhile thousands of colonies are on the point of starvation and the advancing price of sugar will cause many of these to perish before spring, thus reducing next season's output. All considered, the committee feels that honey need not be sold below prices recommended.

Signed by the Committee:

| | |
|---|---|
| WM. COUSE. | F. W. KROUSE. |
| H. G. SIBBALD. | JAS. ARMSTRONG. |
| P. W. HODGETTS. | MORLEY PETTIT, *Sec. Treas.* |

MR. COUSE: We met about July 22nd to consider the crop of the Province. It was a full committee. The situation was rather a peculiar one when we met, from the fact that we found from a number of reports that there was an extremely short crop of honey, amounting almost to a total failure. You would naturally expect that we would surely raise the price, or suggest the raising of prices in that report. The facts were that we found the bee-keepers and the wholesale and retail merchants held a considerable amount of honey over from last year; we hardly knew how much. Owing to the conditions of trade in the Dominion we did not think it wise to advance the price very much.

Upon motion the report was received and adopted.

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## REPORT OF COMMITTEE ON HORTICULTURAL SHOW.

In presenting this report, MR. SIBBALD said: The meetings of the Horticultural Society were held as usual during the year, and all preparations made for a show this fall, but the war made exhibitions almost out of place, and we hardly knew what would be done for awhile. Then the Committee got together, and they thought it would be a good idea to hold the exhibition and to give the receipts to the Red Cross Society, and all fruit growers, bee-keepers, florists and vegetable growers consented to make an exhibit, without any remuneration. Preparations were all made to hold that show, but just at the last moment we could not get the building at the Exhibition Grounds on account of the soldiers having to occupy it, so that the whole thing was declared off. That is the reason we have not a show this year.

I feel like mentioning another matter to the bee-keepers, because you may not know that your Association has been honoured in so far that Mr. Couse, your representative, is President this year of the Horticultural Society.

Moved and seconded that the Horticultural Report be adopted.—Carried.

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## REPORT OF THE REPRESENTATIVE TO THE EXHIBITION BOARD.

MR. EVANS: I think the matter of the exhibition has been pretty well discussed, and I would say, "Let it go."

MR. HOLMES: Appointed by this Association last year as a representative of the Central Canadian Fair, I entered upon the work for the first time and I en-

deavoured to acquaint myself with the situation, with this thought in mind, so far as I could make it practicable, to make the prizes a little better, to the end that there might be a little more inducement for competitors to show at fairs. Having acquainted myself with the Committee, I ventured carefully along that line, with the result that there was a percentage of increase in the prices offered at the fair for that purpose. That being the case, and having found that the Managing Committee were responsive, when a reasonable explanation is offered, I believe that in the coming years further advantage may be gained along the same lines, in the way of holding out greater inducements along the same lines.

Moved by Mr. Lowey, seconded by Mr. Chrysler, that the report be received. —Carried.

The Directors were then elected, also members of the Committee, as given on page 4.

After a long discussion in reference to the organ of the Association, it was moved by Mr. Hopper, and seconded by Mr. Krouse, "That Mr. Sibbald, Mr. Chrysler and the Secretary be a Committee to recommend a Supervising Committee for matter presented for publication in *The Bee-keeper.*"—Carried.

## MORNING SESSION.

The Association again met on Friday, November 13th, 1914, at 9.30 a.m.

The President, Mr. J. L. Byers, took the Chair, and called the meeting to order.

## SWEET CLOVER.

Wm. Linton, Aurora.

The subject assigned to me, Sweet Clover, is not an unwelcome one. Before entering upon it, permit me to remind you that the introduction of a new variety of crop is to every man an experiment; even in the placing of your ordinary crops on your farm you find one field better adapted to a certain crop than another. The same rule holds good in the growth of sweet clover. A valuable feature in its favor is that it will grow abundantly on land too poor for other farm crops, either hard and barren clay or shifting sands, thus providing an easy and cheap means of enriching the sandy soil and loosening the stiff clay.

On better soils it is a fast grower, and gives off a large amount of pasturage, or, at least, two crops of hay, and being a biennial, it may be pastured the first year and hay or seed in the second year; in fact, a crop of hay may be taken off the second year early, and seed later.

Like any other strange food, cattle do not take to it directly, but do so very soon, and are very fond of it ever after; and I may add that it is a strong fodder, though I have never found any taint from it on the milk.

For hay, it must be cut before it reaches the woody stage, whether in the first or second year's growth, and the same holds good when using it for ensilage. When cutting, the stubble should be higher than in ordinary hay, as it does not sprout from the ground, but from the stem.

Its use as a field crop is neither new or local; it has already encircled the globe. Its native place is supposed to be Bokara, in Central Eastern Asia, and reports of its adoption as a field crop come from China, India, Hungary, and westward across the continent of North America, where it adapts itself to a broad range of climate—from Alabama to the farthest point north, it has been sown in Canada. In our climate it does not winterkill, as is the case with almost all other leguminous plants. It is not a weed. A weed is a plant that grows where it is not wanted, and does harm to the crop it is amongst; its biennial habit precludes this, and its worst enemy can point to it only in waste places and on the wayside where cattle are forbidden.

What are its benefits? That is too broad a question to answer fully here, and I can only give a few: First, it is a great soil builder, returning the lost humus to worn out land, and making fertile land where the humus has been exhausted or washed away, and I have seen it grow on sand, devoid of grass, so vigorous that a man could not walk through it any easier than through a tangle of hazel.

It is said to contain three times as much nitrogen as ordinary red clover. As a stock food, I have already spoken.

It is an excellent bee food, the honey being extra clear, and having a very fine flavor. Being a natural self-feeder, it may be sown at almost any season with fair chance of growth, and with or without a cover crop. It affords an excellent orchard mulch. In fact, if I were to read to you the good things said of it in Bulletin No. 224 of Ohio Agricultural Station, I would seriously impose on the time of other speakers. Permit me to quote to you the summing up of the matter in that publication, substituting the word Ontario for Ohio: "Sweet Clover has a work to do in Ontario. It will help to solve the problem of the abandoned field. It will make profitable agriculture possible on sterile acres. It will stop the waste of the hills, heal the scars on washed or gullied fields, make green pastures possible where now no grass is growing, and hold for prosperity the priceless heritage of a productive soil."

A MEMBER: Is the hay pretty hard to cure?

MR. LINTON: It is not hard to cure; it must be cured differently from the ordinary hay; it should be put up almost immediately or it looses its foliage, the leaves fall off. I showed a stalk or two at our exhibition twelve feet high; I put it in comparison with others just to show.

THE PRESIDENT: In breaking up a sod of sweet clover do you find it bothers you any the next year in the grain crop?

MR. LINTON: Not the slightest if you get it under. You must have a wide plow and a heavy chain. If you didn't cover it right up it would, but a plow will kill it.

A MEMBER: The roots do not bother you?

MR. LINTON: No sir, not like Lucerne.

MR. FRANKISH: How much seed do you use to the acre?

MR. LINTON: Twelve pounds where you are going to pasture, but for hay I would use sixteen.

MR. CHRYSLER: How many times do you have to seed to get a continual crop of hay?

MR. LINTON: We re-seed every second year. Of course it dies naturally.

THE PRESIDENT: It is a biennial?

MR. LINTON: Yes.

MR. PETTIT: Supposing you didn't plow, it will re-seed itself?

MR. LINTON: Yes. If you have a poor thin sod sow the seed on it, sow it at any time. Now is a good time to sow it and many are using it in my neighborhood. Our concessions are a mile and a quarter from Yonge Street and the back end of the farm never gets any manure; they are now sowing sweet clover to fertilize that land.

MR. PETTIT: Would that take the place of barnyard manure?

MR. LINTON: Oh yes. When you get it up high and put a heavy chain on it and roll it under, if you are an agriculturist, if it does not please you I don't know what would.

MR. CHRYSLER: What about growing timothy hay when that seed is always coming up in your fields?

MR. LINTON: If you sow it among the timothy hay and cut it when you cut your timothy it would not go to seed. If you cut it as low as you cut your timothy hay you would kill it.

THE PRESIDENT: Wouldn't the presence of sweet clover injure the quality of the timothy hay?

MR. CHRYSLER: You would not know which crop to harvest.

THE PRESIDENT: It would make a difference in the market; you couldn't sell that mixed hay.

MR. LINTON: I don't suppose you could. You couldn't sell it at the price, but it is bad policy to sell timothy off a farm, to my idea.

MR. FRANKISH What length of stubble would you recommend?

MR. LINTON: About four inches.

MR. FRANKISH: You could hardly cut it with your mowing machine?

MR. LINTON: Yes, pretty well.

MR. FRANKISH: It requires the clover huller to thresh it.

MR. LINTON: We run it through the ordinary machine first.

MR. COUSE: Do you hull all the seed?

MR. LINTON: We do, after it has been threshed out by the ordinary machine.

MR. COUSE: Sometimes it is marketed unhulled?

MR. LINTON: I believe so, but if it is sown in the spring unhulled, half of the seed will not come up. We have found you must have a solid seedbed. If you plow a field in the spring and it is loamy and mellow never sow sweet clover on it, but when you have had one crop off it you can grow Lucerne or red clover better than you ever grew it before.

A MEMBER: As a honey producer what is it?

MR. LINTON: It is essentially a honey producer but how good that honey is I can't tell. It is very clear and it tastes nice to me.

MR. NEWTON: I noticed you said in your paper it had an extra fine flavor?

MR. LINTON: Yes, to me.

MR. NEWTON: I will tell one experience I had with it and probably others might have had similar experiences. Some years ago where we had a short crop of honey I was shipping to British Columbia and had been for years, and this year I couldn't fill the order and I knew a party that had a good crop of clover honey, so I wrote to this man and sent him a sample of that variety of honey. It was an excellent flavor as far as the honey was concerned and of a nice color, and he said, send on some and he would try it. The next year when he wrote for his supply for the winter he said in his letter, "If you can't send me any of your own, please don't send me any of the cinnamon honey that I received

last year, because it has practically killed my market for honey in this part of the country." They took it there as cinnamon honey instead of sweet clover and the flavor was against it. At the Pan-American in Buffalo, there were acres and acres practically covered with sweet clover, and during the exhibition Mr. Herschiser's bees at the New York State Exhibit were working and working all the time and this is what they were gathering. It is of a greenish color and very thin and decidedly poor flavor as far as I am concerned and I find people who once buy it don't want it again if they know what it is. For my own part we have a few spears of it in our locality and as bee-keepers I hope we will never get any more. As far as I can find out it is not a good honey for winter stores.

MR. ARMSTRONG: Mr. Chrysler spoke about how it would be if there was sweet clover among his timothy hay. There is no trouble about that. If you don't let sweet clover seed you will have no sweet clover in any kind of hay. I would be safe in saying that I don't think there is any one in the house or any place else that has ever seen sweet clover two rods from the fence where the field was cultivated. We have acres and acres of sweet clover on the road. The bee-keepers sowed it all, I never sowed any myself, but the first start we got with sweet clover was in Mr. D. A. Jones' time.

MR. LINTON: The demand to-day for the seed comes from the farmers where D. A. Jones was. I can give you an instance where a man rented a farm and it was all sand hills and sweet clover got into it off the road and nothing would grow on it and everybody was pitying the man and saying he would never get rid of it. He plowed that sweet clover under and more than paid his rent off about ten acres.

MR. ARMSTRONG: I don't feel the same as friend Newton does about sweet clover. The farmers with us are sowing sweet clover and I think it is a very nice thing especially in a year like this. This year was a failure with sweet clover; there was very little sweet clover in bloom, but it is all ready for another year.

MR. SLADEN: To keep bees from robbing I think sweet clover is a useful plant, by cutting it early in August. In that way it would greatly help bee-keeping operations.

MR. CHRYSLER: Someone recommended diluting ten pounds of sugar, that would be enough to keep one hundred colonies busy during the day—if you dilute it ten to one. It is practically the same line as gathering sweet clover honey. I have had sweet clover in my neighborhood from 25 to 30 years, and a great deal of it, and I was most enthusiastic over sweet clover as far as bee-keeping was concerned. I won't say how much I sowed in my earlier experience. The curse has been coming on me from seed I never sowed. However, it is the flow of nectar of sweet clover which I have found is a boomerang to the bee-keeper in my locality, and I think my experience extends through Ontario. It hits your colonies of bees, it hits the worker force of your bees. Why does it do that? You can feed a colony of bees two or three ounces of honey a day outside or inside the hive when not in the honey flow and it will stimulate brood rearing in August and September when nothing else is coming in. You feed for a month and you have a good big strong colony when you start and by the end of two months you will have a debilitated colony. You can do that for winter feeding. You can feed small quantities day after day and use up the pollen in the hive and next spring you will have no bees.

With sweet clover honey they have to gather so much of it, and the bee is of a nervous disposition and she will wear herself out carrying loads and loads of water for such a small percentage of honey, and she dies an early death. I don't believe bee-keepers should dictate to farmers what they shall grow. If the farmers wish to grow it all well and good, and from my observation and my belief a farmer can pay for the best farm in his township probably if he grows one crop of seed and sells it at the price that it has been quoted at, but how long is this going to last, that is the question? For wintering feed I find it is not the best. It is a poor yielder one year with another to depend on any surplus.

## QUESTION DRAWER.

(Conducted by Mr. Newton).

Q.—Would combs that have had European Foul Brood in be good combs to use for extracting our brood chamber?

Mr. Newton: I think it is a very dangerous ground to tread upon. I think it would be all right for an experienced bee-keeper, but I think for an amateur is is very dangerous ground for him to use old combs that have been in the brood nest or over the brood nest where there has been diseased colonies. I don't recommend anybody using those combs at all. I say destroy them.

Q.—What size of hive would you recommend, 8, 10 or 12 frame hive, Langstroth hive, for extracted or comb honey?

Mr. Newton: For myself during the past two years I have gone back to the eight frame Langstroth hive.

Q.—What temperature do you advise for cellar wintering?

Mr. Newton: About 42 deg.

Q.—What is the best spacing device for frames in a district where propolis is very abundant?

Mr. Newton: Thumb and finger. I have tried very many different ways, and as an inspector when I was out on duty I was sorry many a day that the self-spacing frame had ever been introduced into the fraternity of bee-keepers. You would find hive after hive in a locality where there was lots of propolis gathered that it would be impossible to open at all because they were propolized up so much they were tighter than if there were no frames at all.

Q.—If sweet clover is cut for hay where is the value for honey? Is there any bloom after the hay is cut?

Mr. Newton: Yes.

Q.—Will sweet clover beautify the roadside?

Mr. Couse: Yes, the odor.

I would like as a member of the Executive to have an expression of opinion as to whether the present arrangement is satisfactory.

Mr. Holmes moved, seconded by Mr. Couse, that the plan adopted this year by the Executive be fully endorsed and recommended for the future. Carried.

## GOOD COMBS AND HOW TO OBTAIN THEM.

Geo. F. Kingsmill, C.E.F., Ottawa.

After Mr. Pettit has announced that an average of but sixteen pounds per colony is reported of the white honey crop you may at first jest at the subject of my address to you, "Good Combs and How to Obtain Them," and suggest that "Good Combs and How to Use Them," would be a more suitable subject. But the bee-keepers are a very optimistic class of people and even though failure has visited the majority of them this past season, they are anticipating and making preparations for a bumper crop in 1915. And since we have not a large crop on our hands and our minds are not occupied with the problems of marketing and transportations we may take this opportunity to think about our combs which are one of the most important parts of our bee-keeping equipment.

First of all, what do we mean by a good comb? Briefly it must have three qualifications. It must be built in a substantial, well made frame; it must completely fill the frame with worker cells, and thirdly, the frame must be interchangeable with the other frames in the hive so that it can be lifted from its position and fit exactly in another position.

The frame is almost as important as the actual comb. We make the frames but the bees make the comb. We are to be blamed then for any poorly built frames. Frames may be cut at home just the same as window sashes and stairs can be made at home, but it is cheaper and better to obtain them already cut from a supply factory. The strips must be smooth and squarely cut, no jagged or feathered edges, and cut exactly to measurement. This exactness is very important, so much so that I would be inclined to pass by the local saw-mill, because they are not exact enough with their cutting.

Receiving the parts of the frame in the knocked down state it is but a simple matter for the careful handy man to nail the frame together. To facilitate the nailing and wiring as well as the putting in of foundation, various jigs or frames have been made. While on inspection work I saw a great variety of contrivances for doing the same work. These four models are used for nailing, wiring and embedding foundation in the frames. They have been used and found to be suitable for doing rapid and neat work. Some of you have been using different jigs for your nailing up and if you are satisfied with them, by no means change your methods, but if you are not satisfied these models will be of particular interest to you.

Two kinds of jigs are in use for holding the frames for nailing. With this one the frame is handled, turned end to end and upside down for receiving the nails at the various joints, while in this second jig the frame remains in the jig and the jig is reversed, etc., to facilitate nailing.

This first one consists of a solid base of 2 in. lumber, 22 in. long and 9 in. wide. About the centre a piece of 2 in. by 2 in., 18 in. runs up and 9⅜ in. from it, that is, near one end of the base is another piece with an enlarged end. The centre upright is grooved to hold the top bar. The end bar is laid in its place on the top bar and is held in position by resting on the enlarged upright at the end. Two nails are now driven through the end bar into the top bar. The frame is reversed and the other end bar nailed in place. Now the partly nailed frame is laid on the three short uprights, two of which are attached to the two long uprights, and the third is at the other end. When the frame is

placed top downward on these it is resting solidly and the bottom bar can be nailed quite easily in its place. The frame is now solidly and squarely nailed together. This second jig, as used by Mr. A. C. Miller, consists of the solid base with two cleats nailed on the back to support the jig when stood on its edge. The cleats on the front simply hold the end bars in place while the top and bottom bars are being nailed.

Lay the jig flat on the bench. Place the end bars in the grooves and the top bar in place. Run two nails through the end bar into the top at each end. Stand the jig on its lower side and drive a nail through the top into each end bar. Reverse the jig for nailing the bottom bar. Nail one end of bottom bar only, leaving the other end open. The frame is now ready for wiring.

No. 30, tinned wire is used. The end bars are punched at the factory with three or four holes. The four holes are preferable, the top one being near the top bar so that the top wire will serve to hold the foundation at the top and the wedge and groove fastening is therefore unnecessary.

The wire is stretched by winding it on this stretching board. This board is twice the length of the frame; the ends are bound with metal to prevent the wire cutting into the soft wood, and this groove at this end permits the shears to be inserted to cut the wire. Drive a spike through the centre of the board from edge to edge and fasten to the bench. Wind the wire on the board. When sufficient has been placed on the stretcher, place the hive tool under the wires and insert a small piece of section as a bridge. Gradually work these bridges toward the end of the board as the wire stretches. Leave for an hour. Tie string around the wires and board, one at each end and cut the wire. The wire is now ready for use.

Running the wire through the frames is the next operation. These boards are nailed together to give a large flat surface from the back of our wiring jig. A small cleat is fastened to the jig just inside the frame and another at the other end in the same place. These pieces hold the frame in place on the jig. Lay the frame, bottom bar up on these cleats. Run the wire through the centre holes and then through the lower and upper ones. Fasten the wire near the top bar by driving a shoe tack into the side of the end bar, winding a few turns of the wire around the partly driven shoe tack, cut the end off the wire and drive home the tack. Tighten the wires from the bottom and fasten the upper wire by means of another shoe tack. The frame is now wired, but the end is still open. By means of this lever which works on a pivot the end is forced into place and nailed. The wires are not very tight.

The foundation is cut the dimensions of the inside of the frame, except ⅜ in. shallower to permit a slight sagging without buckling. The sheet is laid on the foundation board of the same size and the wired frame placed on top. The wires are embedded by running this wide toothed tracing wheel over them. Our frames are now filled with wired foundation and are ready to be placed over the colony to be drawn out. This should be done during a honey flow as the bees only draw out foundation when they need comb space. In using the foundation in the supers have the frames of foundation beside one another, but if in the brood chamber a frame of foundation may be sandwiched between two frames of brood.

## AFTERNOON SESSION.

At two o'clock the Vice-President, Mr. Krouse, called the meeting to order.

## SIMPLE METHODS OF REARING AND INTRODUCING QUEENS.

F. W. L. Sladen, C.E.F., Ottawa.

I think stress has been laid on the word simple. It is very important we should know how to rear queens because we want to Italianize very often for European Foul Brood, and also we want young queens; we want to re-queen every two or three years and to fill up the losses. It is not always satisfactory purchasing queens.

Before going into the details of queen rearing I should like to say what probably you all very well know, that the production of a fertile queen has two stages. The first stage is the rearing of the queen, and the second, her mating. These two stages are quite distinct and there has been a good deal of confusion amongst beginners in mixing them up. For instance, I have sometimes heard it stated as a reason against using baby nuclei that you cannot rear good queens in them. They were never intended for rearing, but only for mating. You must use a strong colony for rearing queens.

The simplest way of getting queens is not to rear them at all but to save those that are reared naturally during the swarming season, and you get excellent queens that way. There is no difficulty about size, because the bees know how to rear queens perfectly well. The only trouble is these queens are not being produced all through the season and also they are reared only in certain colonies, namely, those that are about to swarm. In this way you perpetuate the swarming impulse yet you do not increase it, because that is the way in which queens have been reared by nature from time immemorial. The simplest way of saving these queens is to break the colony up into nuclei when they are nearly ready to hatch, that is, six days after the swarm has gone off, if its departure has not been delayed by bad weather. The old queen usually leaves the hive as soon as the first of the queen cells is capped and then you have about seven days till they hatch. Each nucleus should consist of one or two combs containing honey and brood and queen cells. I have been accustomed to use at least two combs in England, but I believe that here with your higher temperature during the honey flow—you have a honey flow of some sort going on during swarming—you can use just one of the large Langstroth frames if care is taken to see that each nucleus has enough bees, brood and stores. If you break up a nine frame colony into nuclei and use three frames for each nucleus you have only three nuclei, whereas if you use one for each you have nine. The brood you get in the hive that has swarmed six days previously is just the brood you want, it is all capped or about to be capped. It is a mistake to have much young brood in the nucleus because a few bees will desert and the rest will concentrate on the capped brood and then you get the uncapped brood chilled.

Mr. Frankish: Is it an easy matter to get brood the same age in other colonies?

Mr. Sladen: The best way to get the capped brood in other colonies is to put ordinary combs containing brood in all stages into a super six or seven days before, with a queen excluder underneath, then the young brood has developed

into older brood when you want it. If you give young brood to a nucleus, suppose the queen should fail to hatch, the bees may rear another from it and you get a scrub queen, but if you give only old brood they cannot rear another. But these queens that are raised under the swarming impulse are good; almost every cell contains a good queen, unless you have the misfortune to have European Foul Brood and that attacks a larger proportion of the queen larvae than of the worker larvae. By holding a cell that is just about to hatch up to the light, you can see the pupa in it and if you shake it you can feel it rattle.

I want to dwell for a moment or two on the nuclei you have formed from the colony that has swarmed; they are really excellent nuclei because they contain young bees that have recently hatched and also they are expecting the queen to hatch and so they cling to their comb, and crowd especially around the queen cell; you don't get them returning to the old colony to any extent. The capped brood is not only a great attraction, it is a great advantage; it gradually strengthens your nucleus. The best way is not to break up the colony till evening and then the bees cannot go back till the next day, then they settle down to the changed conditions and are quite content with them before morning.

If you do not want to be troubled with artificial queen rearing this is the best way to get new queens. But the bee-keeper who wishes to improve his stock will not be content with queens from his swarming colonies, and he will raise them himself. Now, right at the beginning of this I want to explain to you that it is more important to describe principles than methods and appliances. If you grasp the principles of queen rearing then it does not much matter how you carry out the details. Each apiary has its own particular conditions and the details differ according to the way in which you carry them out in each apiary.

Now, in starting queen rearing, where most beginners fail, and this I want to impress very much, is in not getting the queen rearing colony into such a condition that it will start all or nearly all the cells that have been given to it. Of course you can give eggs and let them rear queens from these, but you lose several days which you need not do if you start with larvae that are two days old, which is quite satisfactory. If you start from eggs you are three to five days behind hand. That is an important matter, so I recommend starting from young larvæ and transferring the larvæ to cell cups which can be either ordinary queen cells or, what I much prefer, little wooden cups lined with wax; there is also the Doolittle cup, which you are familiar with, made of wax by means of a hay rake tooth dipped in melted wax; I think it too much trouble dipping four or five times to make each cup, especially as you have to make them fresh for each queen, and so I prefer the wooden cups which can be used again and again. The only disadvantage with these is they are not at present on the market. They are easily turned out of wood. It is very simple to wax these cups, just pour wax into them and pour it out again, holding the cup upside down for a few seconds. To make the cup ready for use again just pick out most of the old jelly and twirl a moistened stick in it. It is a mistake to suppose these cups have to be made very accurately. The bees will start cells from cups of almost any shape that is near the shape of a natural queen cell. The inside of the cup is polished and just about ⅜ of an inch in diameter. Having these cups you prepare a colony to start its larvae and there are various ways. Most bee-keepers are honey producers and having plenty of bees they are not anxious

to get queens from a minimum supply of bees, consequently I would recommend to you a method which though it sacrifices a colony each time you rear a batch or two, is a very sure and safe method and you are sure to succeed. During the honey flow go in the morning to a fairly strong colony containing a fertile queen and brood in all stages and young bees and remove the queen and all the brood except one or two combs which contain mostly sealed brood; replace the comb that have been removed with combs containing honey. Four hours later—do not wait till next day—you give the larvæ in their cups to this colony and I find the bees always accept all or nearly all of them, at least 80 per cent. There are some kinds of bees and some colonies that do not accept the larvæ so readily as others, but this method seems to convince them all they need a queen badly and they start rearing these larvæ.

To put the larvæ into the cups you go to the colony of desired strain and take out a frame containing a number of young larvæ; lean the frame first towards the light so that the light falls into the bottoms of the cell, then enlarge or pare down the cells and insert this little quill, which is nothing more than a small hen's feather sharpened like a pen at the tip and with the tip turned up, slip it under the larva. Lift up as much jelly as you can with the young larva and deposit it in the cup by drawing the quill away and there you have the little larva lying in jelly in the cup. The larvæ selected should be twice the size of the egg, about between the size of a mignonette seed and a lettuce seed. I use what I call a carrier for the cups which consists of a piece of wood half the depth of the hive with a strip of wood nailed on the lower edge with the tips of some fine nails projecting; on to these spikes you fasten your cups. The cups are made of willow or some such wood which is fairly soft so that you can easily press it on to these spikes and then place them in the hive. At the time you take out the brood you leave a space beside the frame of brood you have left in the hive to take this carrier. A colony will start a great many more cells than it will finish and it is advisable to give them many more than you intend to finish. You can use two carriers, one on each side of the frame of brood. That will mean they will start upwards of 36 larvæ. You may get perhaps only 30 started but that is plenty; they cannot rear more than 12 or 15 well, but you may have another colony ready to rear queens and you can give the remainder to it. Next morning you can see how many have been started and you will see the bees have drawn out the cells a little way and each larva is floating in a large quantity of royal jelly. That is the method I practised for many years in England but when I came to try it in the drier climate of Ottawa I found my queens were usually undersized. The reason for that is, in the dry climate the larvæ are allowed to dry out in the cups when first given. The bees do not immediately give them jelly and the result is they may starve for a few hours and that has an effect on the queen. It is very important the larvæ should be well nourished from the time they hatch till they are fully fed. Consequently the only way to get over that is to take out your larvæ the next morning and graft another lot. That seems a lot of trouble but it is apparently necessary in some cases. If you have a colony that is going to swarm you can get jelly from it and prime your cups with this jelly. But I find priming with royal jelly is not altogether a success. You can never put the jelly in so well as the bees put it in themselves and so the bees are liable to remove it and the larva again has a chance of getting starved for a short while, but if you supply the first batch of larvæ the day before and then the next day give your second

batch—I mean to say take your larvæ out of the cups and put in others—there is so little jelly in the cell you don't disturb that, and you can deposit the new larvæ in exactly the same position as the old one or in some part of the jelly without the bees detecting the substitution. Of course the difficulty with this putting of larvæ into a queen cell after the bees have prepared it is that the bees in building out queen cells reduce the aperture so that it is difficult to insert a larva neatly into a cell unless you get that cell in the early stage very soon after the bees have started to supply it with jelly. That is why the next morning is the best time to do that. It is advisable to use one's judgment; one might examine the larvæ three hours after to see whether they are being accepted and those that are not receiving jelly should be removed. If you start with 30 and want only 15 you can afford to take away 15 that are poorly supplied with jelly. Ten days after starting the larvæ the cells will be ripe. That is an important date to remember. By ripe I mean almost ready to hatch. The queens will be due to emerge one or two days afterwards. Of course these cells must be kept warm and a good place to keep them is where they were started, where they were being reared in the colony rearing queens, but it sometimes happens that you want to rear another batch in this colony and you can do that as soon as the cells have been capped which is four days after they have been started. Then you must take the first cells away because the bees will not rear more than 12 or 15 queens at a time. You must take those cells away and put them into a nursery. I do not recommend doing this, it is high-pressure queen rearing which is not necessary in the ordinary honey producer's yard, but a professional queen rearer would do that. This nursery which I designed myself, has some features about it which are rather desirable.

This is the most complicated article on the table, the most expensive and the least useful, and it is not really necessary unless you are going in for rapid queen rearing. At any rate here you see you have a very thin frame, containing about 50 compartments which will hang between two frames of brood and they will incubate 50 cells in a strong colony. Always put in between frames of brood in all stages, in a strong colony. I have found queens will mature faster caged like this between frames of brood in a normal, strong colony than they will free in a colony which has been rearing the queens such as I have described, with only one frame of brood. At the end of the ten days you have the option of introducing the ripe cells to the nuclei direct or of waiting until they hatch and then introducing the virgin queens. For the honey producer and beginner introducing ripe cells is probably the better method except under one condition which I will explain later. I have not found it safe to introduce a hatched virgin to a nucleus. Some queen breeders say you may run her in and if newly hatched she is always accepted but I have not found that to be the case. I think she is very often mauled and killed; and the only way to safely introduce is with the cells. This little protector prevents the tearing down of the cell. This is very necessary. You may make a protector yourself out of wire cloth but this protector made of wire wound in a spiral known as the West protector is more durable. Manufacturers of bee supplies do not always know what we want and this West cell protector is often made in a form and shape that is entirely unsatisfactory. This one was made in England from mild steel wire and with some alterations it is now satisfactory, but the kind I have seen supplied from the United States often are very large and have very stout wire, making a much larger thing which is not nearly so satisfactory. I want a protector

which will go between the combs and yet be large enough to hold the cell. I also want a hole in the bottom. They are often supplied without. You must have a hole in the bottom of the protector to let the queen out, otherwise she would die. The usual form is with a little projecting piece like that to press into the comb. That I do not consider the best. I prefer to unwind that a little way and have a long stem and then bend it backwards and forwards and have a little handle by which it can rest between the top bars of two frames, and then you insert it between the brood or in the centre of the cluster where it is warm, and when the cell is hatched two or three days later all you have to do is to separate the two frames and pull out the protector with the empty cell inside, without lifting out any of the frames. Those are little points which though they do not seem important make a difference when you are constantly using an appliance like that. These can be very easily made, a matter of a few cents a dozen. Those and the cups and the quill are practically all you need for queen rearing, so the outfit is not costly or difficult to get.

Now I have spoken of introducing ripe cells to the nuclei—at least the cell protector. If you allow the virgins to hatch they should be introduced while they are still young. When I allow them to hatch in this nursery I always put a pellet of soft candy in the bottom of each compartment for the queen to feed upon, and the day after the queens are due to hatch I go around and take the empty wooden cell cups out and turn them upside down so that the queen cannot go back into the cell again because if the cell is left there the queen will nibble it sometimes and cover herself with nibbled pieces of wax and she will sometimes go back into the cell and die there, so it is rather important to turn it over.

One advantage of introducing virgins is you see the virgin before you introduce her; you can see her color, size and if she has any defect, and can select only those queens that are perfect. There is a very good way of making a nucleus with these virgin queens which I recommend. It is not safe to introduce a hatched virgin to a nucleus unless it has been especially made up about four hours previously with no young brood and the bees closely confined from the time of the making up until nightfall. The best time to make up the nucleus is about noon and the queen may be run in with a little smoke about 4 p.m. Open the entrance late in the day when it is too dark for the bees to return home, and by morning they will have settled down with the new queen. This trouble of bees returning is rather important, and the best way to prevent it is to make up your nuclei in the out apiary and bring them to the home apiary. I say that because you live at the home apiary and can better attend to the nuclei there. It is important to use young bees and capped brood in making up nuclei: avoid old bees and young brood. Beginners I should always advise to use brood. Those who rear only a few queens may use for each nucleus an ordinary hive containing two or three combs and a division board and an entrance reduced to half an inch. Use your ordinary equipment. Eight frame hives are lighter than ten frame hives. Ten frame hives will do. There is no harm in having a lot of room in the hive and if you have a tight fitting division board the better plan is to divide a hive in two and make an entrance on each side or an entrance in the back. Also nail the bottom board to the brood chamber for easy transportation and to prevent possibility of communication. Twin baby nuclei, each frame one third the size of the Langstroth frame, and each nucleus containing two combs of this size are excellent for mating queens with the smallest force of bees but they need skilled attention every week, and the queens must be removed and queen cells given

periodically. I think with the honey producers one of the chief troubles is not always having a colony to take the queens when they are to be removed from the nuclei. With the larger nuclei all you need to do is to add a frame and give them room and they will build up into strong nuclei without any trouble; and the bees are of some value, whereas the bees in the baby nuclei are of no value. To many bee-keepers attending to these baby nuclei is a fascinating pleasure and a delightful relaxation from the ordinary work of the apiary. We all have different temperaments. Some would think it a bother, others would enjoy it.

To get a large percentage of young queens mated by drones of a desirable strain, the drones must be reared in immense numbers from queens of a desirable strain. In rearing Italians because they are more resistant to European Foul Brood, and for other reasons, you want pure Italians, and for this purpose you must have Italian drones in enormous numbers. The large honey producer is very well situated for that because he Italianizes his apiary to begin with and he has an immense force of bees and all he needs to do is to put a drone comb into those of his hives that are headed by Italian queens and by the home-raised daughters of purely mated Italian queens in order to get an immense force of Italian drones. Those drones will in most cases be sufficient to get far more than half of his queens mated by Italians and the remainder do not matter so much. The half-bred, that is the first generation after crossing which if your Italians are dark somewhat resembles them in colour, is usually fairly resistant to European Foul Brood and has good qualities almost equal to those of the Italians, except a hot temper. When you get into later generations, I mean when the bees get darker, you get them more susceptible to disease and still worse tempered, and what is worst of all, they are very uncertain, some colonies may be good industrious colonies and others lazy. So you don't want to get beyond that half-bred, and you want as far as possible to have your queens purely mated so as to keep up and improve the pure Italians from year to year. This rearing of Italian queens and getting them purely mated is very important because if you want to keep Italians and do not rear them you have to keep buying fresh queens.

Now, summarizing the important points to be noted, it may be said in the rearing stage the larvæ must be transferred when they are not larger than twice the size of the egg, be well fed throughout the development; even the parent colony before they are transferred should be in a prosperous condition with honey coming in. I don't recommend anyone to rear queens after the honey flow except for special purposes. The pupæ must not be allowed to get chilled and afterwards the queens must be prevented from getting access to one another after they hatch. For the mating stage the nuclei must be formed so that you can keep them in sufficiently but not over supplied with bees and stores and with room to work; baby nuclei if they are allowed to get filled with food will swarm out and that is very unsatisfactory. An average maximum daily temperature of at least 65 deg. is necessary; some days 70 deg. and other days 62 deg. and so on. If you get it between 70 deg. and 80 deg., as you usually do, all the better and a good honey flow greatly facilitates success.

Queen rearing is an essential part of any attempt which may be made to improve the honey bee. This problem has received my careful attention for some time, and last summer a start was made at Ottawa which it is hoped will lead to results. We would like our bees to be more industrious but I don't think there is much hope of increasing the industry of the bee: it is a marvel of industry at present. Generally speaking when there is nectar in the flowers and it is not

nearly dried up, they will go for it and gather it most eagerly, so that I don't think we can improve their industry; also I do not think we can lengthen their tongues materially. There must be a variation in the direction in which we expect an improvement. There are two qualities which there is some chance of improving and these have a direct bearing on two very important problems in bee-keeping. We know we have a bee which is resistant to European Foul Brood. I mean the Italian bee. We may be able to improve its resistance. The other problem is the swarming problem. The Carniolan bee we know is very prone to swarm. That tendency to increased swarming is certainly inherited and conversely we may assume that the tendency to diminished swarming is also inherited. I would not like at present to go so far as to say non-swarming is inherited, but it is quite possible it is. I don't know of any work that has been done to investigate that point. I had a stroke of luck in finding a queen in the apiary of the Central Experimental Farm, Ottawa, that showed distinct non-swarming tendencies, not only during one season but in two seasons, and feeling that this was material upon which I ought to work, I concentrated efforts this year upon breeding from this queen, and by means of a process of inbreeding which I succeeded with in England I think I have now got fourteen or fifteen queens, most of which are probably mated by drones produced in the same colony. I am very much interested in these queens and hope next June we may see whether they show less swarming tendencies than the other colonies in the apiary or not. If they do it will be perhaps the foundation of a non-swarming bee. To secure pure mating is the principal difficulty in bee breeding. I had recourse to a method which I found successful in England of waiting till the end of the season till the local drones are mostly killed off. They are never killed off, there are always a few left, so that in order to succeed with this method you have to do the mating in a region where the bee is of a different color entirely to the queens which you are mating. I am fortunate in Ottawa in having not far off, about forty miles to the north of us, a region where black bees only are kept: there is an Italian apiary 30 miles away, but even the hybrids do not seem to have got into that particular region. I waited till the end of the season and took my queens up there and with five thousand of their drone-brothers and I think a large proportion of the queens, must have been purely mated. Those that were mated with a black drone will show it by the slightly darker color of their workers. I also sent some queens to the prairie to be mated and they came back, three of them, mated, but I have my doubts whether they were mated by my own drones because there are indications that isolation of four miles is necessary for pure mating. When you work that out in square miles it means fifty square miles. You have to search that area twice a year to find out if there are bees there. It is impracticable in a fairly well settled region. The region in the prairie was specially chosen because they have a very cold winter there and the trees are scarce and small and there is very little bee forage.

There remains the subject of introducing queens. The most extensively used and tried method of introducing queens is to cage the queen in the hive for some time. We have been hearing a great deal lately of the smoke method of introduction, and in the olden times we heard of the tobacco smoke method which you remember was brought into prominence by Henry Alley. It seems to be rather hard on the bees to stupify them in order to introduce the queens. Now a method has been introduced by Arthur C. Millar of using ordinary smoke, a rather heavy dose of it, and hunning the bees in. Lately there had been complaint as to its

failing sometimes. I have not tried it extensively. I cannot say the caging method is altogether a certain method, but it is largely used, and if you take certain precautions it seems to me so far it is the one I can recommend as the most reliable. I prefer a wire cloth cage containing a wooden block with a hole in it plugged with soft candy. This is a cage I used in England: it is on the principle of the well known Miller introducing cage, which is a very good introducing cage. There is a handle on it which I find convenient. I hang this between two frames of brood in the centre of the hive and leave the tin slide covering the candy for the first 24 or 48 hours, then I draw the slide and let the bees liberate the queen by eating the candy, which they will do in about 24 hours more. The advantage of an automatic liberation is the queen steps out when the hive is not being disturbed. In explaining this appliance I might say it is important not to let the queen come into contact with the solder, if the flux used for soldering has not been completely washed off, as this is very poisonous to queens. This wire cloth has been boiled in water after it was soldered and afterwards varnished with two coats of varnish. The common block painted wire cloth used for screening flies is a safe material for the construction of queen cages. Then, another thing is the wood in a screen cage. I never like to use a resinous wood. This wood is basswood, and it has been soaked in melted paraffin to prevent the moisture being absorbed from the candy. Don't disturb the colony to see if the queen is safe till a week later, and before introducing the queen be sure there is no queen already in the hive. If it is more than 11 days since the colony lost its fertile queen a virgin may be there, and she is very hard to find; you see no eggs, you see no sign that there is a queen; you can sometimes tell it by the behaviour of the bees; there is a peculiar hum—I have called it roaring—when the hive is first opened soon after they have lost their queen, but they produce it less when weeks have elapsed. When they lose their queen and also their brood the roaring is loudest. For instance, a colony prepared for queen rearing, as I have explained to you, will always roar loudly when you first open it. A good way of telling whether a colony has a queen or not is to give young brood. If you find queen cells started you may be sure no queen is present. If, on the other hand, you find no queen cells started you cannot be sure, but very probably there is a queen. Destroy all queen cells when introducing the queen. In early spring I have had good success with introducing cages that are pressed into the comb; these are made from a piece of two inches square of wire cloth by cutting out the corners and folding down the sides. I also unravel the sides. Queens are easily introduced during the honey flow, and hardest just after the honey flow, especially if robbing has occurred. Later on when the bees have settled down to the new conditions they will accept the queen more readily, but even then it is a mistake to introduce a queen unless they have been well fed up. I like, if possible, to put a young bee from the hive to which the queen is to be introduced in with her. Unless brood has been reared lately you cannot get a young bee, but if there is brood in the hive pick out one or two fluffy young bees and put them in with the queen. Italians or pure blacks are less likely to kill a queen than hybrids.

Q.—Are those queen cages made by any manufacturer?

Mr. Sladen: No, they are not, but they could be made I should think if there is any demand for them. I should like to ask the Hamm & Nott Company or some other manufacturer to take up the manufacture of these in that shape and also these cups, because I think they are useful appliances which bee-keepers would find of great help.

Q.—Is the second hive you put your queen-larvæ into queenless?

MR. SLADEN: I don't put them into a second hive; I put a second lot of larvæ into the cells and return them to the same hive.

Q.—They are finished off in the hive you first put them in?

MR. SLADEN: Yes, unless you have a surplus of started larvæ. These can be put into a second hive preferably between some combs of brood which have been placed a day or two previously in a super on top of a strong queen-right colony with queen excluded between brood chamber and super.

Q.—The first time you put larvæ in the cell do you put any jelly in with them, or do you just give them larvæ with what little food there is in the bottom of the cell?

MR. SLADEN: No, I don't usually put jelly in beyond what I can scrape up with the larvæ from the bottom of the cell, because I haven't got it. I don't find it much advantage if I have, because the bees will often clean it all out again. I find they will accept the larvæ almost as readily without. There is also an inconvenience in getting the jelly, and I don't trouble about taking care to have a supply of jelly on hand. If your colony from which you are taking the larvæ has many nurse bees and not too much young brood the young larvæ are floating in a considerable amount of jelly already.

Q.—Will the stock you are now experimenting upon be available to the bee-keepers of Canada?

MR. SLADEN: I hope so, in time, but in raising queens late in the season we have some difficulties to contend with, including the loss of a good many queens in mating.

MR. SIBBALD: Do you consider the cells started in a queenless hive and raised that way are as good as if the frame was taken out of that hive and put into a colony with a superseding queen, for instance?

MR. SLADEN: Yes, if the work is carried out as has been explained. The bees that are rearing the queen larvæ and are supplying them with the special milky food (royal jelly) have just been supplying this food to a much larger number of larvæ. That is why it is advisable not to wait a day or two before giving the larvæ, but give them not more than four hours later while they are still laden with this food.

Q.—Are queens hatched in 11 days always poor queens?

MR. SLADEN: No; eleven days from the transferring of the larvæ is the normal time. If a queen takes 13 days she may be a poor queen, because her development has been retarded by chilling.

Q.—Queens produced from larvæ too far advanced hatch out earlier, do they not?

MR. SLADEN: Only a few hours.

MR. SIBBALD: If one larva were a day older than the others when you grafted it it would hatch earlier?

MR. SLADEN: Yes.

MR. SIBBALD: It wouldn't hatch a day earlier?

MR. SLADEN: Not quite.

MR. SIBBALD: How do you account for that?

MR. SLADEN: Because it would be more of a worker and less of a queen, and a worker takes five and a half days longer to develop than a queen from the time the egg is laid.

MR. GALBRAITH: What is the difference between drone and worker larvæ?

MR. SLADEN: The drone larva is the male larva, and it dwells in the drone cells, but the worker larva is female, and is found in the cells of worker size. You must always select worker larvæ for queen rearing. There is no easily recognizable difference in the appearance of drone and worker larvæ when only two days old.

MR. FRANKISH: I use a three frame nuclei and I raise all the Italian drones that I can, what percentage of pure mating would I get providing I had my nuclei two miles away from my home apiary?

MR. SLADEN: Two miles is not nearly sufficient isolation. If you had five thousand drones in your mating yard and you had thirty thousand in your home apiary the majority of your queens would be mated by the drones from your home apiary; but if you wait until the end of the season when those thirty thousand drones have been reduced down to two or three thousand, and you still have five thousand drones in your mating yard when you would get a large majority mated by the drones in your mating yard.

MR. SLADEN: If you can raise a very large force of drones the better plan is to rear a large number of drones from the daughters of your best queens in your largest yard, preferably your home yard, in June and July, rear and mate your queens there, too, unless you suspect a large number of undesirable drones are being raised within four miles.

Q.—Are the cell protectors always necessary in introducing a queen cell?

MR. SLADEN: Not always.

Q.—Can you introduce them successfully without the protector?

MR. SLADEN: Oh yes, sometimes you can, but there is a risk. The protector is also a convenient receptacle for the cell; you can lift it out easily.

Q.—How long did you say you confined your nuclei before introducing the virgin queen?

MR. SLADEN: Four hours. It doesn't do to put it off till next morning or they will kill the queen; I keep them confined till nightfall. I generally make up my nuclei at noon and run the virgins in at five o'clock in the evening and open the entrance at seven or eight o'clock in the evening.

MR. CHRYSLER: Is there any plan by which we could successfully use the transferring of eggs instead of larvæ?

MR. SLADEN: The egg is a very delicate thing and it stands on end in the cell. It would be difficult to remove it without damaging it I should think.

MR. CHRYSLER: I can do it; I have got on to the doing of it and I can do it better.

MR. SLADEN: The better way would be to carry out the Alley plan and not touch your eggs at all, but cut your comb containing eggs into strips and let the bees form their queen cells from them themselves.

MR. CHRYSLER: I can scrape an egg from the bottom and replace it into a cell and still it will stick up in the same way.

MR. SLADEN: I would imagine the bees might sometimes destroy those. The only objection to the eggs is that it takes longer to get the queen.

MR. CHRYSLER: I wouldn't mind that if I got a little bit better queens.

MR. LUNN: I take a small penknife for cutting the comb down close, and I cut close around the cell, and I lift out the cell instead of the larvæ as I used to do, and place the cell—it is only about one-sixteenth of an inch high—in the bottom of the queen cup, instead of touching the larvæ, because my nerve is not steady enough to pick up the larvæ.

MR. SLADEN: How do you get the queen larvæ into the cell?

MR. LUNN: I cut out the whole cell and place it in. The cell already has larvæ in it. I just cut through and lift out the whole thing.

MR. SLADEN: That is a good way; that is like a method recommended by Prigden some years ago.

THE PRESIDENT: Do you cut out the cell?

MR. LUNN: I don't touch the inside of the cell at all. I simply cut around the cell and lift out the whole cell and place that in the queen cup. It is generally a little tight and it will stay in easily. To anyone who can't see very well it might be a help.

MR. SLADEN: Do the workers destroy your work sometimes?

MR. LUNN: Occasionally they will, but still I can get better results that way than I did before.

MR. CHRYSLER: That means you just graft at once, but I put great importance on the re-grafting of a cell; you then get a double amount of royal jelly; in your first grafting you may not feed it up to the extent they would, especially if you have a poor honey flow, and this re-grafting is one of the most important things I consider in queen rearing. In fact, I have raised some good queens this year in the poor season when they were practically robbing all the time.

MR. SLADEN: How long do you leave them in before you re-graft them?

MR. CHRYSLER: The way I do, if I have a poor queen and I wish to replace her, I take that colony—the poorest colony I have in the yard—and I will go and pinch the queen's head off and in five days I will go around again and make the first grafting, at the end of five days you may occasionally find a cell sealed; you will find them in different stages, but you will find the majority of them just about at the end of five days in a nice state to re-graft and they have got royal jelly, and just before the larvæ gets too large—I don't like to re-graft them in cells where the larvæ is too large—you have a lot of them and you can select them and take your pick and re-graft into those you like best.

A MEMBER: Just natural cells?

MR. CHRYSLER: Yes, I can get cells then when I can't any other way. That is what I was forced to do. I like the other method splendidly, only what I would rather do is if I could get them into artificial cups so that I could cut them out better and put them where I wished.

---

## QUESTION DRAWER.

(Conducted by MR. NEWTON.)

Q.—What would be good to prevent poisoning from a bee-sting?

MR. GALBRAITH gave an instance of stinging from bees received by a child, and the head was sponged over with alcohol, and it was not over half an hour until the child was on the street again.

THE PRESIDENT: Doctors say the only thing known to be of much use is aromatic spirits of ammonia.

MR. SLADEN: Very soon after the sting is received I know of a case where there was a rash and very difficult inbreathing, and that has been an increasing susceptibility, and the only advice the doctor gives is keep away from bees. Each person is of a different nature.

Mr. Wartman: In our vicinity there is quite a lot of spraying done in full bloom and quite a few of the bee-keepers complain about the destruction of their bees in this way and they would like to know if there is any way by which this could be stopped, by imposing a fine on people.

Mr. Burkholder: Isn't there a law along that line?

The President: There is, but it is very inefficient.

Mr. Wilde: Is not a fruit locality a poor one for bees anyway? Better move into a good locality.

Mr. Wartman: All the fine we know of is one dollar, I think.

Mr. Pettit: Twenty-five dollars.

Mr. Couse: What about the Isle of Wight disease?

Mr. Sladen: We are not hearing so much about it now as before. I am referring to the outbreak in England. It seems to be dying down. It has been pretty well decided what is the cause of it, it is a parasite known as *protozol nosemia apis*. Under ordinary conditions it seems to do the bee no harm and I believe it is quite plentiful throughout the United States and even in Canada, but in England there seems to have been a particularly virulent type of it and under conditions prevailing there it caused widespread loss. I don't think we need be afraid of the disease at present here. I think it is important we should not introduce bees from England from the infected regions or we may start an outbreak here, more likely in regions that have a climate similar to British Columbia, for instance, on the British Columbia coast or on the eastern coast. Warm dry weather seems to be rather unfavorable for the disease, while damp cool weather and damp winter especially, seem to be favorable.

Mr. Couse: The reason I asked the question was because I was speaking to a man that had 70 colonies and it has practically reduced them down to a few.

Mr. Sladen: They say any colony that has been affected goes on showing it till it has died out. I heard of one case of 70 colonies which was practically wiped out. It is believed the disease can sometimes be picked up from stagnant pools and they have advised destroying them. They have tried various remedies but there seems to be nothing that will kill the parasite without killing the bee. There seems to be no preventive.

Q.—What should be done with well drawn extracting combs that have the wax moth in them?

Mr. Couse: Sulphur will help to kill them—put them in a tight room and sulphur will kill the live moths as well.

The President: Carbon bisulphide is more effective than sulphur as it will kill all the eggs, but you want to be careful not to come around with a light as it will take fire.

Mr. Pettit: I have never had much trouble with wax worms. We have them every year but we find the cold weather coming on always stops their operations. I always find the safest plan is to have surplus combs stored in a place where they freeze and I would answer that question at this time of the year in that way. In hot weather I would keep the combs with the bees. Fumigating is good but I have never practised it. In cases where I have found wax worms, I would pick them out of the combs and pile up the supers on some hives, putting three or four supers on one hive if necessary and the bees will protect them.

## A DIVIDING-BOARD.

W. A. Chrysler, Chatham.

Three or four years ago I made about forty of these boards similar to a bee escape board without the escape in it, but instead a piece of perforated metal nailed on one side and a tin slide to open and close on the other side of the opening in the board.

The idea I had for its use was the prevention of swarming and also for and in the production of comb honey, for which purposes it has been a complete success. From time to time I have made other uses for it, which have been numerous and valuable. In fact, I find it one of the most useful and labour saving devices in the apiary.

Outside of the uses for the production of comb honey without swarming, it can be used in making increase to a better advantage and also holding the colony together and preventing increase. Bee-keepers who have or allow natural swarms could also hold their bees together by putting the new swarm in hive on top of the old hive with its entrance reversed and closed with this board in between them with its entrance strip shut and tin slide open. Bees in the old hive as they hatch will ascend and strengthen the new colony. Should increase be desired, shut tin slide and leave entrance to old hive open. Queen cells that have been developed will hatch in due time, and queen will mate and lay. You can thus have two queens in one hive laying at the same time if necessary.

It will be impossible to explain all of the uses here so that all may understand, but I will mention a few more uses in which it is invaluable. That of queen rearing, mating of queens above it or below it has been always successful where queen excluders or wire cloth would not be a success. Safe and quick introducing of queens when bees are robbing it is a great aid. In feeding bees in the fall, uniting colonies at any time, building up weak colonies in spring by having two or more colonies on the one stand. I begin to find it necessary to have one of these implements for every colony.

A Gathering of Bee-keepers of Leeds and Grenville.

# Forty-Fifth Annual Report

OF THE

# Entomological Society

## OF ONTARIO

## 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
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*To His Honour* JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present, for the consideration of your Honour, the Report of the Entomological Society of Ontario for 1914.

Respectfully submitted,

JAMES S. DUFF,

*Minister of Agriculture.*

Toronto, 1915.

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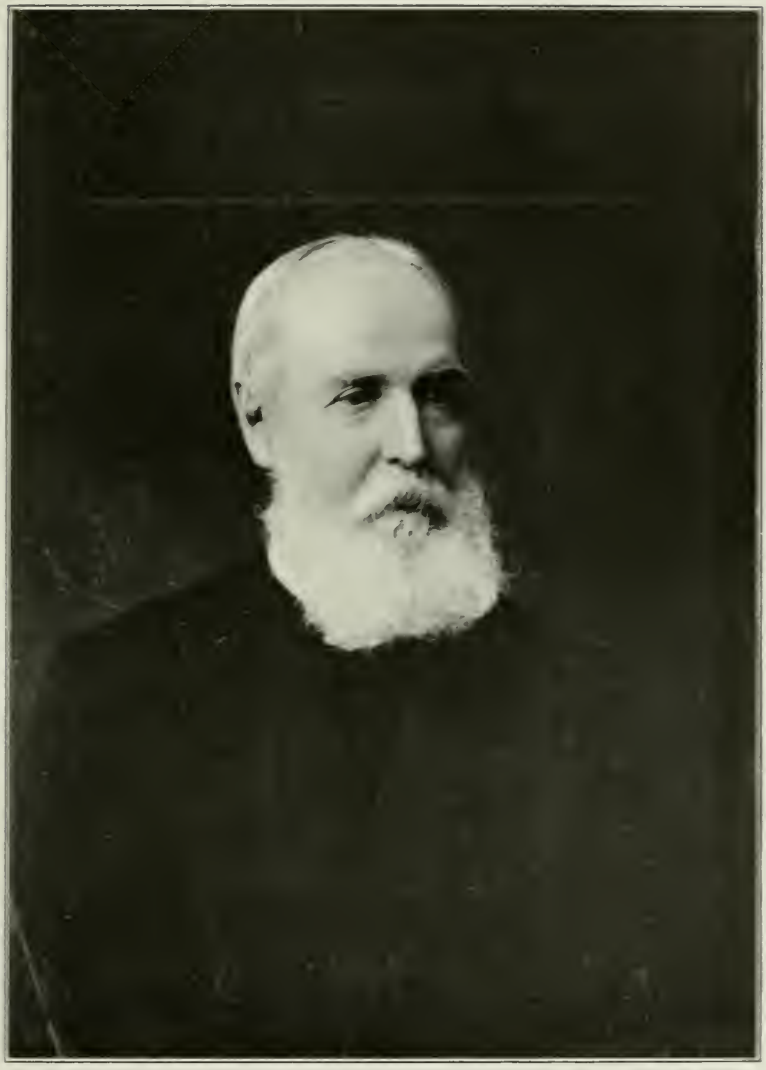
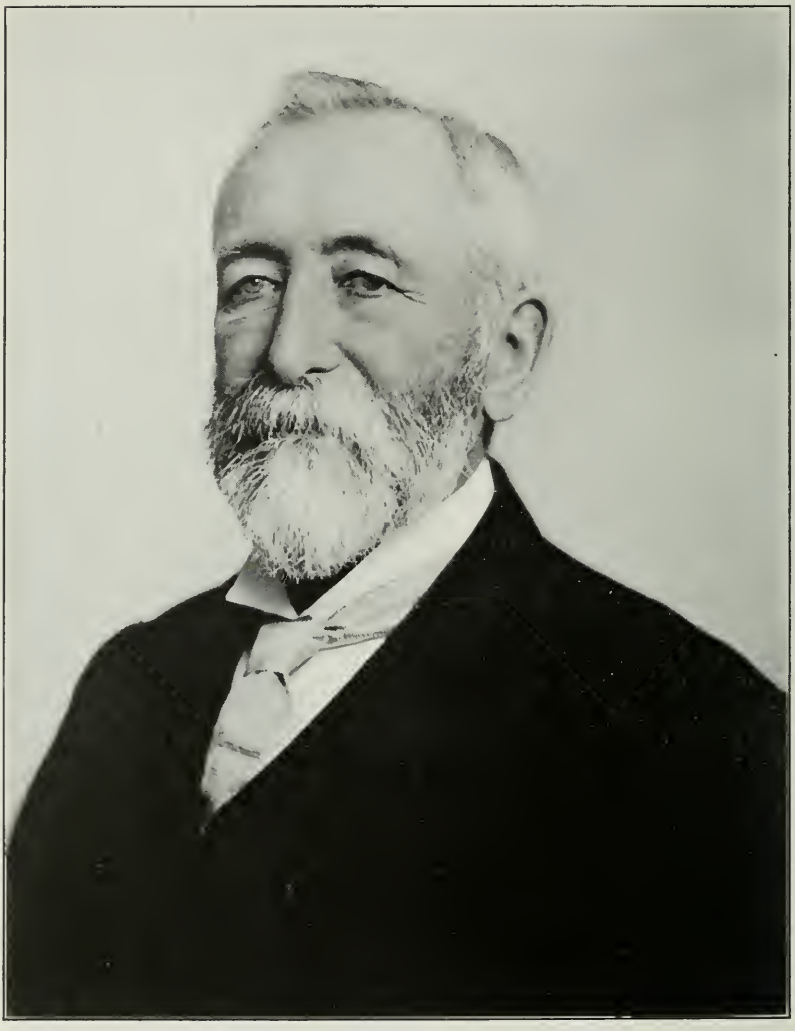


Rev. Dr. C. J. S. Bethune.

(See page 30.)



Dr. William Saunders, C.M.G.

(See page 29.)

HENRI FABRE

In his room and seated at the table where he wrote his "Souvenirs Entomologiques."

(Illustration reproduced from "*L'Illustration*," to which paper grateful acknowledgments are made.) (See page 61.)

Henry H. Lyman, M.A.
(See page 118.)

# FORTY-FIFTH ANNUAL REPORT

OF THE

# Entomological Society of Ontario

1914.

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*To the Honourable James S. Duff, Minister of Agriculture.*

SIR,—I have the honour to present herewith the Forty-fifth Annual Report of the Entomological Society of Ontario, containing the proceedings of the Fifty-first Annual Meeting, which was held at Toronto on the 5th and 6th of November, 1914.

The meeting was well attended, and much discussion took place on various subjects of importance, particularly on the outbreak of the Army-worm in Canada in 1914. A full report of these discussions is given in the following pages, together with the papers and addresses presented, and the reports of the various officers and branches of the Society.

The work of the Society continues to be carried on with vigor and enthusiasm, the activity of the British Columbia Branch, which a few years ago had been entirely suspended, being worthy of special mention.

*The Canadian Entomologist,* the Society's monthly journal, continues to maintain its wide circulation in spite of the increased subscription price. The forty-sixth volume now completed, is the largest and most fully illustrated that has yet been published.

I have the honour to be, Sir,

Your obedient servant,

EDMUND M. WALKER,

*Editor.*

Department of Biology,
University of Toronto.

# Entomological Society of Ontario

## OFFICERS FOR 1914-1915

*President*—C. Gordon Hewitt, D.Sc., F.R.S.C., Dominion Entomologist, Department of Agriculture, Ottawa.

*Vice-President*—Mr. A. F. Winn, Westmount, Que.

*Secretary-Treasurer*—Mr. A. W. Baker, B.S.A., Lecturer in Entomology, O. A. College, Guelph.

*Curator*—Mr. G. J. Spencer, B.S.A., Demonstrator in Entomology, O. A. College, Guelph.

*Librarian*—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph.

*Directors*—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Department of Agriculture, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. C. W. Nash, Provincial Biologist, East Toronto; Division No. 5, Mr. F. J. A. Morris, Peterborough; Division No. 6, Mr. R. S. Hamilton, Collegiate Institute, Galt; Division No. 7, Mr. W. A. Ross, Jordan Harbour.

*Directors Ex-officio* (ex-Presidents of the Society)—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., O. A. College, Guelph; W. H. Harrington, F.R.S.C., Ottawa; Prof. John Dearness, Normal School, London; Rev. T. W. Fyles, D.C.L., F.L.S., Ottawa; Prof. Wm. Lochhead, B.A., M.S., Macdonald College, Que.; J. D. Evans, C.E., Chief Engineer, Central Ontario Railway, Trenton; Prof. Tennyson Jarvis, B.S.A., Grimsby; Prof. E. M. Walker, B.A., M.B., University of Toronto.

*Editor of "The Canadian Entomologist"*—Prof. E. M. Walker, Toronto.

*Delegate to the Royal Society of Canada*—Prof. Wm. Lochhead, Professor of Biology, Macdonald College, Que.

*Auditors*—Prof. J. E. Howitt, M.S.A., and Prof. L. Caesar, B.A., M.S.A., O. A. College, Guelph.

## FINANCIAL STATEMENT

For the Year Ending October 31st, 1915

| *Receipts.* | | *Expenditures.* | |
|---|---|---|---|
| Balance 1912-13 | $599 09 | Cork and pins | $33 64 |
| Dues | 133 65 | Printing | 1,509 49 |
| Subscriptions | 455 05 | Expense | 33 75 |
| Advertising | 16 94 | Salaries | 250 00 |
| Government grant | 1,000 00 | Library | 38 83 |
| Reports and back numbers | 188 00 | Annual meeting | 16 00 |
| Cork and pins | 61 19 | Annual report | 85 00 |
| Bank interest | 14 01 | Bank exchange | 8 90 |
| | | Balance on hand | 492 32 |
| | $2,467 93 | | $2,467 93 |

*Auditors*: J. E. Howitt, L. Caesar.

Respectfully submitted,
A. W. Baker,
*Secretary-Treasurer.*

# LIST OF MEMBERS

## Ontario.

Astwood, J. C.....Port Arthur.
Auden, K. F.....Toronto.
Baker, A. W.....Guelph.
Bicknell, H. E.....Toronto..
Bock, H. P.....London.
Brimley, J. F.....Grimsby.
Burrows, A. R.....Guelph.
Caesar, Prof. L.....“
Calvert, J. F.....London.
Cleeves, A. C.....Guelph.
Cosens, Dr. A.....Toronto.
Craigie, E. H.....“
Curran, H.....Guelph.
Dearness, Prof. J.....London.
Doherty, I. K.....Ottawa.
Duff, G. H.....Hamilton.
Duncan, R. S.....Port Hope.
Dunlop, James.....Woodstock.
Evans, J. D.....Trenton.
Fouse, C. M.....Toronto.
Germain, Bro.....Ottawa.
Gibson, Arthur.....“
Grant, C. E.....Orillia.
Hahn, Paul.....Toronto.
Haight, D. H.....Sudbury.
Hannibal, J.....Toronto.
Harrington, W. H.....Ottawa.
Harrison, G. T.....Thornelow.
Hewitt, Dr. C. G.....Ottawa.
Howitt, Prof. J. E.....Guelph.
Hudson, H. F.....Ottawa.
Jackson, V.....Toronto.
James, F. W.....“
James, L. E.....St. Thomas.
Jarvis, T. D.....Grimsby East.
Kilman, A. H.....Ridgeway.
Kitto, V.....Ottawa.
Logier, S.....Toronto.
McKechnie, J. B.....“
McCready, Prof. S. B.....Guelph.
Morris, F. J. A.....Peterborough.
Nash, C. W.....Toronto.
Noble, J. W.....London.
Petch, C. E.....Ottawa.
Prewett, F. J.....Toronto.
Ross, W. A.....Jordan Harbour
Russell, J. M.....Woodstock.
Sanders, G. E.....Ottawa.
Saxby, J. W.....Toronto.
Sladen, F. W. L.....Ottawa.
Smith, Arthur.....Toronto.
Snazelle, C.....“
Spencer, G. J.....Guelph.
Strickland, E. H.....Ottawa.
Thompson, W. R.....London.
Tothill, J. D.....Ottawa.
Walker, Prof. E. M.....Toronto.
Ware, Thomas.....Paris Station.
Watson, Dr. A. H. R.....Port Hope.
White, James.....Snelgrove.
Williams, J. B.....Toronto.
Wood, S. T.....“
Wright, W. H.....Guelph.

## Quebec.

Barwick, E. C.....Montreal.
Brainerd, Dwight.....“
Burgess, Dr. T. J. W.....Verdun.
Chapais, J. C.....St. Denis.
Chagnon, G.....Montreal.
Clayson, G. H.....“
Corcoran, J. A.....“
Davis, M. W.....Westmount.
Dunlop, G. C.....Montreal.
Du Porte, E. M.....Macdonald College.
Griffin, A.....Montreal.
Gooderham, C. B.....Macdonald College.
Henderson, G. M.....Montreal.
Huard, Rev. V. A.....Quebec.
Moore, G. A.....Montreal.
Simms, H. M.....“
Southee, G. A.....“
Tapp, W. H.....Quebec.
Tourchot, A. L.....St. Hyacinthe.
Winn, A. F.....Westmount.

## Alberta.

Baird, Thomas.....High River.
Bentley, Lettice.....Lethbridge.
Carr, F. S.....Edmonton.
Dod, F. H. Wolley.....Midnapore.
Mackie, Donald.....Edmonton.
Moody, Miss.....Calgary.
Tanner, H. E.....Clyde.
Whitehouse, F. C.....Red Deer.

## Manitoba.

Criddle, Norman.....Treesbank.
Hunter, Dr. A. J.....Teulon.
Wallis, J. B.....Winnipeg.

## Nova Scotia.

Allen, E. C.....Yarmouth.
Brittain, W. H.....Truro.
Good, C. A.....“
MacKay, Dr. A. H.....Halifax.
Payne, H. G.....Granville Ferry

## New Brunswick.

Vroom, J.....St. Stephen.

## Saskatchewan.

Androchowicz, E.....Humboldt.
Johnson, G. S.....Moose Jaw.
McCulloch, A. J.....Regina.
Neville, S. J.....Cottonwood.
Willing, Prof. T. N.....Saskatoon.

BRITISH COLUMBIA.

Abbott, R. C.....Mission City.
Abbs, A. W.....Vancouver.
Abriel, T.....Nakusp.
Anderson, E. M.....Victoria.
Anderson, J. R.....“
Angus, M.....Peachland.
Bain, T. H.....N. Vancouver.
Banks, W. W.....Salmon Arm.
Barnhill, E. E.....Kelowna.
Bird, M. L.....Vancouver.
Blackmore, C. H.....Victoria.
Brand, James.....Vancouver.
Brealey, A.....Hatzic.
Brett, W. F.....Armstrong.
Breun, L. A.....Victoria.
Bryant, T.....Ladysmith.
Brydon, J. M.....Victoria.
Bush, A. H.....Vancouver.
Chapman, C.....Vancouver.
Clark, R.....“
Cockle, J. W.....Kaslo.
Collins, H. W.....Grand Forks.
Colpits, R. D.....Revelstoke.
Creese, H. H.....Kelowna.
Croker, A.....Victoria.
Cunningham, T.....Vancouver.
Currie, H. B.....Salmon Arm.
Davidson, J. T.....Vancouver.
Day, G. O.....Vancouver Island.
Evans, H. H.....Okanagan Centre.
French, P. E.....Salmon Arm.
Fulton, C.....Kelowna.
Fulton, G. H.....Port Haney.
Gavet, D.....Vancouver.
Gemmel, M.....Sechelt.
Getchell, F. H.....Vancouver.
Hadwen, Dr. S.....Agassiz.
Hanham, A. W.....Duncan's Station.
Harvey, R. V.....Victoria.
Heselwood, R. J.....Kelowna.
Hill, Tom.....Vernon.
Hill-Tout, W. S.....Abbotsford.
Hippisley, Mrs.....Terrace.
Hoy, B.....Vernon.
Hugh, W.....Victoria.
Hunt, E. C.....Creator.
Jackson, W.....Creston.
James, F. T.....Victoria.
Kyte, R. J.....Notch Hill.
Landells, R.....Golden.
Lang, W. A.....Peachland.
Leach, D. H.....Salmon Arm.
Lyne, W. H.....Vancouver.
Matheson, J. B.....Kelowna.
McCubbing, C.....Salmon Arm.
McHardy, C. F.....Nelson.
McKenzie, K.....Kelowna.
Melhuish, J. S.....Walhachin.
Middleton, M.....Nelson.
Mitchell, D.....Tappin.
Nicolle, W.....Nelson.
Norman, P.....Victoria.
Northcote, T. H.....Mission City.
Palmer, L. L.....Vernon.
Palmer, R. M.....South Cowichan
Parham, G. L.....Invermere.
Patch, A. M. W.....Vancouver.
Peters, R.....Victoria.
Reed, E. Baynes.....“
Rich, Edith.....Ladner.
Rine, Henry.....Victoria.
Robertson, W. H.....“
Robinson, E. H.....“
Ross, A. H.....Nelson.
Rowland, A.....Vancouver.
Ruhman, M.....Vernon.
Russell, D.....Lavington.
Scott, Col. B.....Salmon Arm.
Scott, W. E.....Victoria.
Sherman, R. S.....Vancouver.
Simons, A. E.....“
Simms, A. C.....Summerland
Skinner, E. M.....Victoria.
Stanton, T. H.....Duncans.
Taylor, L. E.....Kelowna.
Thomson, C.....W. Summerland.
Tomlinson, A. H.....Prince Rupert.
Treherne, R. C.....Agassiz.
Venables, E. P.....Vernon.
Wallace, E. A.....Victoria.
Ward, W. E.....Vancouver.
Whiting, H. H.....Rock Creek.
Wilkerson, G. E.....Victoria.
Wilson, E. H.....Armstrong.
Wilson, Tom.....Vancouver.
Winslow, R. M.....Victoria.
White, E. W.....Sardis.
Woods, Mrs. E. A.....Grand Prairie.

## HONORARY MEMBERS

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Comstock, Prof. J. H.....Ithaca, N.Y.
Cresson, Ezra T.....Philadelphia, Pa.
Felt, Dr. E. P.....Albany, N.Y.
Howard, Dr. L. O.....Washington, D.C.
Webster, Prof. F. M.....“
Wickham, Prof. H. F.....Iowa City, Ia.

## LIFE MEMBERS

Bethune, Rev. C. J. S.....
Professor of Entomology, Ontario Agricultural College. Guelph.
Fyles, Rev. Dr. T. W.....Ottawa.
Reed, E. Baynes.....
Director of the Meteorological Station. Victoria.

# The Entomological Society of Ontario

## ANNUAL MEETING

The Fifty-first Annual Meeting of the Entomological Society of Ontario was held at Toronto on Thursday and Friday, November 5 and 6, 1914, Dr. C. Gordon Hewitt, President of the Society, occupying the chair throughout the sessions. Among the members present were: Prof. J. H. Comstock, Cornell University, Ithaca, N.Y.; Rev. T. W. Fyles, Ottawa; Dr. C. G. Hewitt and Messrs. A. Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. N. Criddle, W. A. Ross, E. H. Strickland and H. F. Hudson, Field Officers of the Branch; Rev. Prof. C. J. S. Bethune, Prof. L. Caesar and Mr. A. W. Baker, Ontario Agricultural College, Guelph; Prof. Wm. Lochhead, Macdonald College, Que.; Prof. J. Dearness, London; Dr. A. Cosens, Prof. E. M. Walker and Messrs. J. B. Williams, A. Smith, C. Snazelle, E. H. Craigie, Geo. Duff and S. Logier, Toronto; Mr. F. J. A. Morris, Peterborough; Mr. J. D. Evans, Trenton; Prof. W. H. Brittain, Truro, N.S.; and Mr. Vernon King, Charleston, Mo.

Among the visitors were Prof. C. R. Crosby, Cornell University, Ithaca, N.Y.; Mr. J. C. Chapais, St. Denis-en-bas, Que.; Rev. Father Leopold, La Trappe, Que., and Messrs. A. B. Baird and S. H. Lord, Ontario Agricultural College, Guelph.

On Thursday morning a meeting of the Council was held in the Biological Building of the University of Toronto. Various matters of business were brought up and discussed and the report of the proceedings of the Society during the past year was drawn up. Much satisfaction was expressed regarding the vigorous condition of the Society, particularly in the rapid development of the British Columbia Branch, and in the Society's excellent financial position. A suggestion that the next Annual Meeting be held at Ottawa was afterwards put before the general meeting and adopted.

In the afternoon the Society met in the Lecture Room of the Royal Canadian Institute, the proceedings commencing at two o'clock. The chair was taken by Dr. Hewitt, the President, and the first order of business was the reading of the reports of the Directors on the insects of the season in their respective divisions.

## REPORTS ON INSECTS OF THE YEAR.

### Division No. 1, Ottawa District—Arthur Gibson, Entomological Branch, Ottawa.

During the growing season of 1914 serious outbreaks of certain well-known insects occurred in the Ottawa District. Weather conditions were very favourable for insect increase and many letters relating to injurious species were received from farmers and others. The following are the pests chiefly complained of:

#### Insects Attacking Field Crops.

The Army-worm (*Leucania unipuncta*). Immediately following the outbreak of the Army-worm in Brant County, western Ontario, considerable anxiety among farmers was experienced when infestations were discovered at Carp, Kin-

burn and one or two other places in the Ottawa District. The Carp and Kinburn outbreaks were investigated by me on July 21st, when fields of oats, barley and corn were found to be freely infested. Many hundreds of thousands of the worms were present. The Army-worm outbreak in Canada, however, during the past season is discussed on page 72.

Locusts. The Migratory Locust (*Melanoplus atlanis*) was again enormously abundant at Bowesville, near Ottawa, and at several other places in the district. The crops chiefly attacked were those which I mentioned in my report last year, viz., oats, barley, timothy and corn. Rather extensive experiments were conducted by the Entomological Branch with the Kansas poison bran formula and other remedies. A brief account of this work is given on page 97. The Kansas formula gave excellent results and we have no hesitation whatever in recommending it.

Cutworms. These destructive caterpillars were again very abundant throughout the district. The interesting outbreak was that of the Common Striped Cutworm (*Euxoa tessellata*), which was very abundant on the Central Experimental Farm, destroying annual flowering plants, tobacco, etc. The Dark-sided Cutworm (*Euxoa messoria*), was also numerous and ruined many young plants, particularly vegetables. The Red-backed Cutworm (*Euxoa ochrogaster*) was injurious in the district and reports were received of injury to peas, beans, clover, corn, mangels and carrots. The Glassy Cutworm (*Hadena devastatrix*) was present in numbers in tobacco fields near Ottawa.

Root Maggots. These regularly-occurring insects were again very destructive in eastern Ontario; and a good remedy for the preservation of radishes and onions is still a desideratum. Cabbages and cauliflowers were again protected on the Central Experimental Farm by placing around them at the time of planting out, discs made from tarred felt paper. Wherever they were applied properly excellent results were obtained.

The Carrot Rust Fly (*Psila rosæ*). My attention was called to an outbreak of this insect in a private garden in Ottawa. At the time of my visit, July 13, the bed of carrots had been completely destroyed, and the tops were wilted and lying on the ground. It is several years since the insect has occurred injuriously in the Ottawa District. Unfortunately, it is rather difficult to control. When young carrots are being thinned out, the spraying of the remaining plants with ordinary kerosene emulsion, one part in nine of water, has been found useful as a protection against injury by this insect. In the Maritime Provinces, where the insect has also been destructive the past season, some growers found the kerosene emulsion of value. Applications should be made once a week during June and first half of July.

The Celery Caterpillar (*Papilio polyxenes*) was more than usually abundant in the district, the chief injury noticed being to parsley in early July. Owing to their conspicuous markings—green with transverse black stripes—they are easily seen, and unless present in extraordinary numbers the remedy of hand-picking is usually all that is necessary.

The Diamond-back Moth (*Plutella maculipennis*) was very apparent in the latter half of June and its injuries were readily observed in fields of cabbages. It is not a difficult insect to control. Paris green in the ordinary strength (1 pound to 160 gallons of water) or arsenate of lead (2 pounds to 40 gallons of water) will control the caterpillars. It is perfectly safe to use either of these arsenites up to a week or two of the time the cabbages are to be used as food.

When spraying cabbages, on account of the smoothness of the leaves a "sticker" should be added to the mixture. Such can be made by boiling together for about an hour two pounds of resin and one pound of sal soda (crystals) in a gallon of water. This is sufficient for 40 gallons and if used with Paris green, one pound of fresh lime should be added.

### Attacking Fruit and Forest Trees.

The two species of Tent Caterpillars, the American Tent (*Malacosoma americana*) and the Forest Tent (*Malacosoma disstria*) were again noticeably present in many places, but the injury was much less than that effected in either of the three previous years.

The Pear Slug (*Eriocampoides limacina*) was abundant in orchards on plum and cherry trees. It is an easy insect to control. If only a few trees are attacked freshly slaked lime dusted on the leaves is a sufficient remedy. If the occurrence is widespread, spraying with either Paris green or arsenate of lead should be adopted.

Other common pests such as the Codling Moth, the Eye-spotted Bud-moth and the Cigar-case Bearer were troublesome in unsprayed orchards.

### Attacking Greenhouse and Garden Plants.

The Rose Leaf-hopper (*Typhlocyba rosæ*). The foliage of roses throughout the district was heavily infested with this insect. The whitish patches resulting from the attack of the insects were very conspicuous in the middle of June. In some gardens the attack was stopped by a weak application of "Black Leaf 40."

The Violet Sawfly (*Emphytus canadensis*). Pansies were injured to some extent by the bluish-black false caterpillars of this sawfly. At Ottawa they were found in the middle of June, and at this time the larvæ were approaching maturity. They feed, as a rule, during the night. We have found that dusting the plants in the evening with white hellebore, or with Paris green mixed with 50 times its weight of common flour, will destroy the larvæ.

The Tarnished Plant Bug (*Lygus pratensis*) was destructive to dahlias and other flowering plants. It is an extremely difficult insect to control. I know of no satisfactory remedy. The bugs are most active during the heat of the day, but in the early morning they are comparatively sluggish, at which time they may be beaten off the plants into an inverted umbrella and then put into some receptacle containing coal oil and water.

Aphids of many kinds were more or less destructive to greenhouse and garden plants. The Greenhouse Leaf-tyer (*Phlyctania rubigalis*) was present noticeably in one greenhouse, and Red Spider was responsible for much damage to many kinds of plants.

At the conclusion of his report, Mr. Gibson exhibited a specimen of the European Praying Mantis (*Mantis religiosa* L.), and said that the specimen was found in a potato field at Carrying Place, Prince Edward County, Ontario. It was, he thought the first specimen ever sent in to the Department at Ottawa. The habits of the insect were briefly discribed and reference given to the first American records in New York State.

Dr. Bethune: I had a specimen taken near Simcoe, Norfolk Co., about two years ago. I thought that was unique for Ontario.

### Division No. 2, Orillia District—C. E. Grant, Orillia.

I have not been able to give much time to the recording of insect destructiveness this season. I wish, however, to note the appearance in this neighbourhood of the two asparagus beetles, *Crioceris asparagi* and *C. 12-punctatus*. I visited the gardens of several friends who had complained of something that was eating their asparagus. In two of these places the tops of the plants looked like a lot of dry sticks, they were so completely stripped of foliage. I found both species of beetles in abundance on the plants. I think they were both equally plentiful. I was also informed that the pest had been noticed the year before, but I never had observed their appearance, though I had been on the lookout for them for some time.

Army Worm (*Leucania unipuncta*). I was informed that in the Township of Orillia some eight or ten miles from town there was a slight outbreak of this insect, and the moths were very numerous at light here, but I did not see any destruction close to town. I never saw the moths so abundant since 1896 when there was considerable damage done in the Township of Mara, County of Ontario, which abuts on the boundaries of Orillia.

June Beetles (*Lachnosterna*). I never saw these insects so abundant It was impossible to sit near the lamp which I keep lighted to attract insects, on account of the constant bombardment by them.

Cutworms were not reported plentiful this season.

Onion and Cabbage Maggots were rather plentiful..

Raspberry Cane Borer (*Agrilus ruficollis*). This species has been very abundant the last few years, the wilted canes shewing up conspicuously.

Tent Caterpillars (*Malacosoma americana and M. disstria*) were abundant. Their webbs were noticed and the moths were abundant in July and lasted right into August.

I took a specimen of *Telea polyphemus* on August 20th, quite a late record for that insect.

I took quite a few new insects but not at present being able to determine them, I must leave a report of them to a future time.

### Division No. 3, Toronto District—A. Cosens.

During the season the following insect pests were abundant enough to attract attention. The Cutworm (*Euxoa*), was particularly destructive in the northern part of the city. In that district a thin layer of loam covers a sandy sub-stratum, furnishing suitable conditions for the maturing of the larvæ. In some gardens the tomato and cabbage plants were regularly cut off until a sprinkling of poisoned bran was used with good results. In the same locality the Onion Maggot (*Pegomyia cepetorum*) has been unusually abundant during the summer. A dahlia grower, who invariably has a number of flower buds destroyed by the attacks of the Tarnished Plant Bug (*Lygus pratensis* L.), informs me that this insect was not so plentiful as usual this season, but Dr. Walker states that he has found the Four-Lined Plant Bug (*Poecilocapsus lineatus* Fabr.) in large numbers on many different species of plants. The market gardeners of Mt. Dennis, a suburb of Toronto, state that the larvæ of the May Beetle (*Lachnosterna fusca* Fröh.) are becoming more numerous. Two apparent causes are contributary to this condition. These gardens are situated in a swamp area, which is cleared and drained a few acres at a time, and as the trees are gradually being removed the birds, that act as a natural check on this pest, are forced to nest in other localities. Also

the star-nosed mole, that feeds on the larvæ, is dug out and killed whenever possible. This can probably be defended, as the undermining of the moles often causes breaks in the rows of vegetables due to the wilting of the plants.

Last fall the larvæ of *Metzneria lappella* Linn., were exceedingly abundant in the heads of the Small Burdock (*Arctium minus* Bernh.). In some infected plants almost every head contained from one to three occupants. A collection was made and kept in a cool place during the winter and a large number of moths emerged in June. Rev. Dr. Fyles first reported this insect in 1898, having found it at Levis, Quebec, where he thinks it was probably first introduced into Canada. It has been in Toronto at least since 1904. In looking over the published life histories of this insect I have not seen mentioned the following feature that appears to be a distinct adaptation to its mode of life. After the moths emerge from the seed heads, small silken tubes are to be seen projecting beyond the scales of the involucre. Through each tube a moth has been able to pass safely the hooked points of the scales and reach the outside. These tubes are either formed by the larvæ in the spring before pupation or are a part of their silken, winter envelope which has been torn away and carried out by the moth during its emergence. I have not yet definitely decided by observation between the two explanations. Owing to the large number of seeds that are prevented from germinating by the larvæ of this species, it is usually considered to be beneficial, but the fact that fewer seedlings will thus appear at one place may operate favorably to the burdock owing to the natural thinning out that has resulted.

While in the vicinity of Toronto the good collecting grounds are gradually being reduced in number, some still remain. Among the best of these is the Mt. Dennis locality mentioned above. In that district a level depressed stretch, several acres in extent, of rich peaty soil produces a rank growth of asters, golden rods and other plants adapted to such a habitat. Skirting this low-lying area are sloping ridges still covered with the oaks and maples of the original forest, while willows, dogwood and viburnum form a transition zone between the highland and the typical meadow flora. On the 17th of July, while Mr. Nash and I were collecting over the low land, we found the butterfly *Melitaea phaeton* Drury, quite plentiful. Numbers of them were flitting about in company with the more common Fritillaries and Meadowbrowns. We captured a dozen specimens, and could have taken many more. The food plant of the species, Turtle Head (*Chelone glabra* L.,) is not plentiful in the locality, but Mr. Nash found colonies of the larvæ established on this plant later in the season.

A very casual examination of gall literature reveals a large number of species, the producers of which are undescribed. To this group belongs the Cynipid gall on the petiole of Wild Strawberry (*Fragaria virginiana* Duch.). The deformity consists of an elongated cylindrical enlargement that when mature shows shallow annular constrictions at the junction of the larval cells giving the gall a somewhat segmented appearance. As the leaves, on which the galls are produced, wither before these are mature it is very difficult to find specimens at that stage. The plan that suggested itself was to transplant the host where it could be kept under observation. From material thus treated, producers emerged from May 12th to 15th. Specimens were sent to Wm. Beutenmüller, New York, and he reports them to be an undescribed species of Diastrophus.

The sawfly gall on the base of the petiole of *Salix humilis* Marsh. is common in High Park of this city, and last fall it was particularly plentiful. Induced by this fact to forget several unsuccessful attempts to rear the producer, I collected

a large number of the galls and kept them during the winter under as nearly natural conditions as possible. A number pupated a couple of inches below the surface of the soil in the breeding jar, and several adults emerged between June 3rd and 10th. S. A. Rohwer, Washington, D.C., to whom specimens were sent, has not yet published his description, but has sent me a manuscript copy of it. The species which has been named *Euura cosensi* n. sp., is said to be closely connected with *Euura nodus* Walsh, a form that produces stem galls on *Salix longifolia* Muhl. From this species it may readily be differentiated by the shape of the sheath and the different sculpture of the head.

The following list includes all the sawfly gall producers as far as reported from this locality.

Fig. 1.—*Euura cosensi* Rohwer, a sawfly gall on the leaf petiole of *Salix humilis* Marsh.

*Euura cosensi* Rohwer.
Host, *Salix humilis* Marsh.

The gall, which is produced on the leaf petiole, is conoidal in shape with a long tapering point, towards the blade of the leaf.

*Euura gemma* Walsh.
Host, *Salix humilis* Marsh.

In this species, the gall is formed by the abnormal swelling of a lateral bud.

*Euura ovum* Walsh.
Host, *Salix humilis* Marsh.

An elongated oval swelling on one side of a twig constitutes the gall in this case.

The three preceding species are common in and near Toronto.

*Euura serissimæ* Rohwer.
Host, *Salix serissima* Fernald.

The gall consists of the enlarged petiole of the leaf. The leaves infested are borne on the branchlets from which the pistillate catkins spring.

In this vicinity only a few examples of the host plant occur, but all of these seem to be infested with the gall.

*Pontania crassicornis* Rohwer.

Host, *Salix humilis* Marsh.

The gall resembles the well known *Pontania pomum,* Walsh, in shape, but is considerably smaller. It is densely pubescent and several are usually crowded together on one leaf.

*Pontania desmodiodes* Walsh.

Host, *Salix humilis* Marsh.

A smooth, flattish gall with a semicircular outline originating from the mesophyll of the leaf of the host.

The last two galls mentioned are abundant in this locality.

Especially in the western part of the city the numerous ridges and plains consist largely of sand sorted over and deposited by the wave action of the glacial. Lake Iroquois. In the light soil thus produced pines and oaks flourish and in the open spaces among these *Salix humilis* finds an ideal habitat. The resulting frequent occurrence of this food plant contributes to the abundance of several of our sawfly galls parasitic on this host.

*Pontania hyalina* Norton.

Host, *Salix alba* L.

The galls are arranged in two almost parallel rows, one on each side of the midrib of the leaf.

This is the most plentiful willow gall in this vicinity. The host has been planted in large numbers and few of these escape infection.

*Pontania lucidæ* Rohwer.

Host, *Salix lucida* Muhl.

The gall is produced as an enlargement of the petiole or midrib of the leaf.

Throughout the district in general this species is not common.

*Pontania pisum* Walsh.

Host, *Salix discolor* Muhl.

An almost spherical pea-like gall, with a small point of attachment to the leaf of the host.

Only rarely found in the locality.

*Pontania pomum* Walsh.

Host, *Salix cordata* Muhl.

A large globular gall originating from the leaf of the host. It is greenish-yellow in colour usually with a rosy tint on one side.

Among the numerous sand ridges, referred to previously, are many streams and ponds of water. These are skirted, often for long stretches, by a screen of the heart-leaved willow. The majority of these host plants are always infested with this gall.

The President: The heartiest thanks of the Society are due to Dr. Cosens for his excellent report, full as it is of the most valuable original observations which should form the basis of considerable further work, and be a very welcome contribution to our Proceedings.

Division No. 5, Port Hope District—F. J. A. Morris, Peterborough.

From Port Hope, Mr. H. L. Bowers records:—"Aphids very bad on peas and consequently Coccinellidæ very plentiful; cut-worms very bad in spring, destroying many cabbage and tomato plants. The turnip Root-maggot was also bad. The White Cabbage Butterfly did a great amount of damage; *Pieris protodice* was plentiful. The Army Worm caused no damage near Port Hope—a few were noticed not many miles west; about fifty of the moths were taken in a light trap. Tent Caterpillars were numerous and caused some damage; the Forest Tents were very noticeable. The Milkweed Butterfly was very rare last year,

Fig. 2.—*Pontania pomum* Walsh, a sawfly gall on the leaf on *Salix cordata* Muhl.

but was more numerous this year than at any time in the last five seasons. Butterflies of the genera *Argynnis, Phyciodes* and *Grapta* were scarce; *Limenitis arthemis* very common; also *Chrysophanus thoe; Pieris napi* and varieties common. All *Papilios* scarce. May-beetles were very bad, and much trouble from their grubs may be looked for later. They ate the leaves from very many young fruit trees.

Below is a list of captures:—

*Apantesis intermedia.*
*Apantesis virguncula.*
*Apantesis parthenice.*
*Lycomorpha pholas.*
*Euchætias oregonensis.*
*Microcœlia diphtheroides.*

*Microcælia diphtheroides* var. *obliterata.*
*Euchalcia putnami.*
*Euchalcia venusta.*
*Euchalcia cuspidea.*
*Euchalcia contexta.*
***Chamyris cerintha.***
*Catocala relicta.*
*Catocala relicta bianca.*
*Synelys alabastaria.*
*Caripeta divisata.*
*Synanthedon acerni.*
*Atrytone pocahontas.*

Mr. R. S. Duncan (from Port Hope) of the Department of Agriculture writes in answer to enquiries that he has not noticed many insect pests about the orchards. He was called on to fight the Army Worm (1) on the Cobourg Road east of Port Hope, and (2) on farms near Charlecote, Perrytown, Newcastle and Solina. The pest was bad, but not nearly so troublesome as in Western Ontario.

The insect collections made by school children have been steadily increasing. At each of the five school fairs in the county, from two to seven collections of insects have been exhibited; some of them very neatly and correctly labelled.

Dr. Watson reports some interesting captures in Coleoptera, including a longicorn (*Goes oculata*) new to his collection taken under a butternut tree during the spell of unusually hot weather about the middle of September.

In the neighbourhood of Peterborough the most noticeable pest was the Tent Caterpillar. Very early in the spring the webs became conspicuous on wild cherry, hawthorn and other trees and shrubs about the lanes and fence-corners outside the city. The newly hatched grubs destroyed even foliage-buds before the leaves had expanded. In neglected orchards they were also very abundant, and had been nearly as bad the season before. Next to nothing was done to cope with the pest till the caterpillars were nearly full-grown; there was then an agitation, and in several places torches were used, but more than half the larvæ escaped by scattering. Towards the end of June the full-grown larvæ began to swarm in masses round the lower trunks of the trees and it was only then that the extent of the mischief became apparent; throughout the city the shade trees showed great ravages in the heart of the foliage, especially basswood, maple and elm. For a week when the creatures swarmed in great masses on the tree trunks, they could be destroyed very easily, but the job was evidently too disagreeable and was left undone. In every mass examined a few of the individual worms proved to be those of the Orchard Tent Caterpillar, the vast majority being the Forest Tent Caterpillar. In an orchard adjoining our house every tree was stripped of foliage and when fire was applied to the webs so many of the caterpillars escaped that the houses on all sides were fairly besieged and many garden shrubs, rambler roses, for instance, were stripped.

In the "fresh fields and pastures new" afforded by a change of residence some interesting observations were made during the season, and quite a large number of additions secured to your district director's collection of Coleoptera, the collecting grounds being chiefly fungus, the fermenting bark, trunks and branches of newly felled trees, and green foliage. At the beginning of May a large alder swamp, partly cleared, yielded some interesting forms of Chrysomelian, at first, of course, specimens that had hibernated. These included three species

of *Chrysomela,* viz., a well-marked variety of *C. scalaris* (if the normal form is that found on basswood), and a very handsome form of *C. philadelphica,* more robust than the normal form and with the ground colour rich chestnut; both of these were taken on alder, feeding freely and abundant. The normal form of *C. philadelphica* was taken in the same locality on dogwood, and *C. bigsbyana* on willow. Later on several interesting longicorns were captured on the trunks of newly-felled white pine, attracted by the fermenting sap and breeding there. Other captures were made on some fallen basswood, and in fungus that had freshly spread over the top of basswood stumps. A pair of longicorns, quite new to your collector, was captured in alder foliage at the end of May; and in the last week of June nearly fifty specimens of the beautiful Elder Borer (*Desmocerus palliatus*). I had only once before seen this creature alive and for the benefit of other collectors I will add some notes. The beetles may be looked for first about June 20th in our latitude and may be taken as late as July 20th. They were nearly all captured on Early Elder (*Sambucus racemosa*), which at this season is bright with crimson clusters of ripe berries; the later species of Elder (*S. canadensis*) having just opened its flat cymes of white blossom. The beetles love to rest on the under side of the foliage, and more frequently were found in small thickets of Elder within the borders and under the shadow of hardwoods. Very few were found on the Late Elder and none on the blossom.

During July immense numbers of Rose Chafers (*Macrodactylus subspinosus*) were observed in High Park, Toronto, feeding on the pollen of New Jersey Tea, and a few on the Late Elder. About the 20th of July, some fifteen specimens of *Eupagonius subarmatus* were taken in Niagara Glen, breeding on the basswood. They were all captured on the underside of the foliage, their instinct to escape by dropping from their perch being utilized in their capture.

In August, while camping in the Algonquin Park I revisited a certain bay on White's Lake and found, after seven years, the same colony of *Phyllabrotica decorata* feeding on the same clump of Skull-cap (*Scutellaria galericulata*). On the willow bushes adjoining the railway *Disonycha caroliniana* was abundant, and among the raspberry patches a very wasp-like clear-wing moth was seen quite frequently.

The President: We are sorry that this report is the only contribution we shall have as a result of Mr. Morris' season's work. It is plain that he has lost none of his old enthusiasm and delight in his new locality.

### Division No. 7, Niagara District—W. A. Ross, Jordan Harbour.

As insect pests have been very numerous and troublesome this past season in the Niagara District, I have before me the rather difficult task of condensing what would fill a respectable volume on economic entomology into a brief report.

### Orchard Insects.

Apple Maggot (*Rhagoletis pomonella*). This year some further work was done on the control of the Apple Maggot. Two Hyslop crab-apple trees, nicely laden with fruit and as near alike as possible, were chosen and each was enclosed in a large cheese-cloth cage. One tree was sprayed four times with sweetened arsenate of lead (2-3 lbs. arsenate of lead: 10 lbs. molasses: 40 gals. water); the other was used as a check. Forty female and nineteen male flies were liberated on the treated tree and fourteen females and eleven males were confined in the check cage. No eggs were laid in the fruit on the sprayed tree, whereas practically

every apple on the check was infested with maggots. This experiment was duplicated by Mr. Lawson Cæsar and me in a large orchard near Mountain, and excellent results were obtained, about which Mr. Cæsar no doubt will have something to say.

Apple Aphids. This spring at Vineland Station Laboratory we commenced an investigation of three species of plant lice injurious to apple trees—*Aphis pomi, A. sorbi, A. avenæ. Aphis pomi* was found to be the most destructive species in nurseries and young orchards, but *sorbi* proved to be the greatest depredator in bearing orchards. The life histories of the three species were studied and the important discovery was made that *A. sorbi* spends the summer on the common plantain (*Plantago major*) and on ribgrass (*P. lanceolata*). (It is very probable that other species of Plantago act as summer hosts). Another interesting point demonstrated was that *sorbi* will remain on the apple all year if overcrowding of the aphids is prevented.

As our study of remedial measures was of a preparatory nature, I shall not mention this phase of the investigation except to call your attention to the gratifying results obtained in the destruction of eggs by fumigation. Seven young trees well stocked with healthy eggs and all taken from the same nursery were used in the experiment. Three of them were fumigated with hydrocyanic acid gas, 1 oz.—100 cu. ft., 1.1.3 formula and the others were used as a check. None of the eggs on the fumigated trees hatched, whereas about 30 per cent. hatched on the check.

The Plum Curculio (*Conotrachelus nenuphar*) was exceedingly troublesome on the Experimental Farm at Vineland. Apples, pears and stone fruits were attacked. Apricots and crab apples suffered most severely from its depredations.

The Pear Psylla (*Psylla pyricola*) was responsible for a considerable amount of damage in several Queenston pear orchards and in one near Beamsville.

The Apple Leaf-hopper (*Empoasca mali*) and its work—sickly, mottled and sometimes curled foliage—were only too evident in some apple orchards in the Vineland district.

Cecropia (*Samia cecropia*) was quite abundant this past season. Larvæ taken from plum and apple trees were sent into my laboratory frequently, and during June numerous adults were found fluttering against the windows of the Administration Building, Experimental Farm, Vineland.

Trumpet Leaf Miner (*Tischeria malifoliella*). This autumn I have noticed more work of the Trumpet Leaf Miner on apple foliage than I have seen during previous years.

*Tetranychus pilosus.* Some experimental work on the control of this plum mite was done on a small scale at Vineland Station, and excellent results were obtained from (1) flour paste (4 lbs.-40 gals.), (2) lime sulphur (1.009 sp. gr.) and flour paste (2 lbs.-40 gals.), (3) lime sulphur (1.009) and tobacco decoction (1 lb.-2 gals.). The last two mixtures proved to be more reliable than the flour paste.

Cherry Fruit-flies. I observed *Rhagoletis cingulata* at work amongst Montmorency and English Morello cherries in a Beamsville orchard, and on the so-called Mountain south of Vineland. I found the fruit on cherry trees growing along the roadsides badly infested with maggots.

The Grape Flea-beetle (*Haltica chalybea*) was present in injurious numbers in several sections of the Niagara District this spring. Numerous complaints were received regarding the depredations of the adults on the buds and of the larvæ on the foliage of grape vines.

The Raspberry Sawfly (*Monophadnoides rubi*) was unusually abundant this year and many raspberry bushes were badly injured by it. In an experiment with arsenate of lead (3 lbs. to 40 gals.) 100 per cent. of the larvæ were killed, but unfortunately the spray severely burned the raspberry foliage. This injury was not due, as one would suppose, to an excessive amount of arsenic oxide in the arsenate of lead, because according to an analysis made by Dr. Shutt, Dominion Chemist, only .31 per cent. of the soluble oxide was present. Can anyone present suggest a factor or factors which might have been responsible for the burning of the foliage?

The Currant Worm (*Pteronus ribesii*) and the currant aphid (*Myzus ribis*) were very plentiful this past season.

White Grubs again proved themselves to be relentless enemies of the strawberry grower. In the strawberry plantation of the Vineland Experimental Farm, a large percentage of the plants had to be dug up because of white grub injury to the roots.

## Field and Truck Crop Insects.

Pea Aphis (*Macrosiphum pisi*). There was a serious outbreak of pea-aphis this summer in Grantham township, near St. Catharines. When I visited the infested fields during mid-July, I found the outbreak on the decline, due to the effective work of coccinellids, their larvæ, syrphid maggots, aphis-lions and braconids. Unfortunately the work of these checks came too late to prevent serious injury to the pea crop.

On the Vineland Experimental Farm I noticed that where peas were grown under irrigation (overhead system) the aphids were satisfactorily controlled by a fungus, *Entomophthora aphidis*.

The Army Worm (*Leucania unipuncta*). In regard to the remarkable prevalence of army worm in Ontario this year, I am pleased to say that the outbreak in the Niagara District was comparatively very light. Corn suffered more than any other crop.

Asparagus Beetles (*Crioceris asparagi* and *C. duodecimpunctata*) were unusually destructive in some localities.

Squash Bugs (*Anasa tristis*) and Cucumber beetles (*Diabrotica vittata*) were responsible for a considerable amount of damage to cucurbits.

The Potato Beetle (*Leptinotarsa decemlineata*) was remarkably scarce, at least in Vineland locality. In my own plot of potatoes I did not find a single beetle.

The Cabbage Butterfly (*Pontia rapæ*) was quite abundant.

## Insects Attacking Trees and Shrubs.

Datana Caterpillars. Black Walnut trees were, in some cases, almost completely defoliated by *Datana integerimma*, and the larvæ of *D. ministra* were found feeding on American Elm and Basswood trees.

San José Scale (*Aspidiotus perniciosus*). A young Black Walnut tree on the Rittenhouse school grounds, Vineland Station, was killed by this destructive scale this year.

Elm Aphids. Scotch elm trees growing in the vicinity of the Experimental Farm were attacked by the leaf curling species (*Schizoneura ulmi*) (*fodiens*) and by the gall-maker (*Tetraneura ulmisacculi*).

Locust Borer (*Cyllene robiniæ*). Because of the work of this notorious borer it seems to be impossible to grow black locust trees successfully in our neighbourhood. On the Experimental Farm lawn one tree was killed and another was rendered worthless by this insect. Adult beetles were very plentiful during August.

Red Spiders (*Tetranychus bicolor*) were abundant on oak and chestnut trees this past summer.

The Basswood Leaf-roller (*Pantographa limata*) was very common in the Experimental Farm wood lot.

*Rhopalosiphum ligustri.* Private hedges in different sections of the Niagara District were severely injured by an aphid which I have every reason to believe is the European species, *R. ligustri.*

The Plant Louse (*Phyllaphis fagi*) was present in injurious numbers on copper beech trees.

The worst foe of our spruce trees and hedges, *Chermes abietis,* I am pleased to say, was exceedingly scarce last summer.

### Miscellaneous Insects.

*Myzus persicæ* was by far the most destructive aphid in the Experimental Farm greenhouses this year. It was especially troublesome on radishes.

The Variegated Cutworm (*Peridroma saucia*) made itself notorious in a Niagara Falls greenhouse this month by attacking the heads of chrysanthemums and razing off the florets.

Dahlias grown in the Rittenhouse school gardens were a complete failure this year, because of the depredations of the Tarnished Plant Bug (*Lygus pratensis*).

This year superheating proved to be a highly satisfactory method of ridding houses of bedbugs (*Cimex lectularius*).

A considerable amount of wheat was ruined in a granary near Ball's Falls by the Granary Weevil (*Calandra granaria*).

The President: I think Mr. Ross' report shows how very diligently he has worked at the Dominion Entomological Laboratory at Vineland. It refers to a number of subjects upon which probably some of the members here would like to ask questions.

Prof. Caesar: In regard to the apple maggot, I had not intended making any comments until next year. The entomologists of the Provincial and Dominion Departments of Agriculture are working together on this pest. We have refrained from publishing up to the present, because we want to be absolutely sure of our results before we put them into print. I have selected one of the worst orchards I have seen for next year's test of the sweetened poison mixture. This year Mr. Ross and I co-operated in spraying 22 acres of apple orchard which was last year very bad with the Apple Maggot, or Railway Worm as it is commonly called. We feel sure that there were plenty of adults there this year. For instance, I took 400 live pupæ in two hours at the one place just by hand. The apples had been left piled up under the trees from last year as they could not be sold because of the insect. I simply removed the apples, took the pupæ out of the soil, put them into some earth and sent them to Mr. Ross, who used them in connection with caged trees. We sprayed this orchard twice, paying special attention that the spray should get on the underside of the leaves.

I did the first spraying and Mr. Ross the second. We sprayed the under surface of the leaves thoroughly. Both of us went back on September 15th and thoroughly examined the trees, and found but eight punctures in the whole orchard—that is in the 22 acres. I had chosen the orchard and had chosen the check. The check consisted of about two acres. To our surprise it was just as clean as the other part. I should have said, "in a way to our surprise," and yet the experience with the Cherry Fruit Fly shows that it should not be a surprise at all; for a check in the same orchard, unless it is a large one and on the side away from the prevailing wind, is almost useless. We went into the neighboring orchard and examined there and found that about fifty per cent. of the Tolman Sweets were punctured. We feel satisfied that there is no other explanation of the success of this orchard than the spraying.

THE PRESIDENT: Mr. Caesar's addition to the contribution of the discussion has shown how very important it is to carry on these experiments for several years even though you may think that you have secured conclusive results. Those who have followed the work which has been done on fruit-flies in general, but on the Apple Maggot in particular, will be impressed with the divergent character of the results, and the more you investigate the matter the more divergent seem to be the conclusions. Therefore, we shall look forward with very great interest to the results of this co-operative investigation carried on by the Dominion and Provincial Governments and continued for several years, in which investigation larger acreages have been treated and studied than has been done in the past. A number of results have been based upon the spraying of just a few trees, and as the work has shown, you cannot base any good conclusions upon any such restricted experimentation; therefore I think the Society is indebted to Mr. Ross and Mr. Caesar for bringing this matter before it.

FATHER LEOPOLD: What mixture did you use and when did you apply it?

PROF. CAESAR: I used three pounds of arsenate of lead to forty gallons of water, in which was one gallon of the cheapest molasses procurable.

A question for entomologists in this connection is, are you going to kill the bees? There was quite an agitation over the use of the sweetened mixtures this year. I used the mixture within fifty feet of a hive of bees. I also used the mixture for the grasshoppers on the same farm, and there was not a bee that came to the molasses so far as could be seen. Those of you who have read in the *Canadian Entomologist* the articles on fruit-flies will see it stated that if you use sugar for sweetening, the bees will feed upon the foliage where it is applied and you may have serious loss, but in the case of molasses they have not been known to do so. In the cherry orchards I kept a sheet spread underneath a tree, covering the whole surface beneath it and, tied to the branches all round, and I never found a bee on that. No bees were seen visiting the sprayed trees. The same thing is true of the work upon the apples for the Apple Maggot and of the grasshopper remedy. Further, I had one of the assistants at the College prepare this mixture and strew it along the ground—that is the grasshopper remedy—within twenty feet of the hives, to see if the bees fed on it. Only two lighted there, but quickly got up and went away. He then held it within a yard of them for nearly an hour. No bees went to feed. I have written to Kansas to Prof. Hunter and to Prof. Dean, and also to Prof. Parrott of Geneva, N.Y., and some others, asking for their experience in regard to the effect of the sweetened poison upon bees, and none of them report

any complaint. I am quite satisfied that there is no danger to the bees though at first I was certainly afraid as to what was going to happen.

Father Leopold has just asked me when you apply these mixtures for the Apple Maggot. *The first application should be made as soon as the adults begin to appear.* That is part of the secret of success. You will find that it will take about ten days for the adults to be sufficiently matured to lay eggs, and in that time they must be destroyed. Then there should be another application two weeks after the first. In Father Leopold's district it would be approximately the 15th July for the first application. The second application should come about the end of July. We applied the first on the 14th to 16th, and the second on the 2nd August. The adults emerge early in the warmer parts of the Province.

THE PRESIDENT: We are discussing the Apple Maggot, and as I do not think that it is a subject which will come up in any of the later papers so far as I can see, it is very important that it should be fully discussed at the present time. We are very glad to have with us to-day Prof. Brittain, Provincial Entomologist of Nova Scotia, in which Province the Apple Maggot has recently been discovered. I am sure you will be glad to hear from him a few words as to the occurrence of this insect in Nova Scotia. I should like to take this opportunity of heartily welcoming Prof. Brittain to our meeting, as I think this is the first one that he has attended.

PROF. BRITTAIN: It was not my intention to say anything about the Apple Maggot. Although I have done a little work this year, it is far too early to say much in that connection. We might however say something about its distribution. The main fruit belt in the Province of Nova Scotia consists of the Counties of Kings and Annapolis, which compose respectively the Cornwallis and Annapolis Valleys. We received a great many reports of the Apple Maggots being found in these places. One man reported that he was certain that he had it, but when we went out we found that it was the Green Fruit-worm. We had dozens of reports, but were never able to locate any manifestation of the Apple Maggot in the main fruit growing sections of Nova Scotia. On the other side, however, in western Annapolis and Digby County, and in the County of Hants, we have already located outbreaks. Late this fall I got a report that some of the insects had been found near Windsor in the Avon Valley, and we found there several orchards extremely badly infested. They were very small orchards and none were sprayed. We never found the Apple Maggot in the Province in an orchard which had been sprayed except in one case where we found two trees infested. The maggot is confined to those districts where very little spraying is done and no care is taken and where orchards are not considered important. In the County of Digby, no spraying is done, and there the insects are worst. Last year one of the inspectors found maggoty apples in Yarmouth County. He went back this year and was not able to find any although probably there were some present. Although we have found the maggot in several places we have not found it in Kings or eastern Annapolis. We found it in districts quite remote from each other. One inspector brought in some fruit from North Middleton, away in the north woods five miles from any dwelling of any kind, which were simply full of maggots. So that it looks as if this insect is not a new one but a pest of pretty long standing in the Province, but it has never been found in the best fruit counties. There has at least been no outbreak of any importance or we would have located it. Our inspectors visited every farm of importance this summer and we have been doing a little work in it of a preliminary character and received some results which are suggestive for further work. That is all we can say about it.

THE PRESIDENT: If there is no further discussion, that concludes the first part of our programme, the reading of the reports of the Directors. As Mr. Winn, our Vice-President is not here, I will call upon our ex-president, Dr. Bethune, to take the Chair while I read my Presidential Address.

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## PRESIDENTIAL ADDRESS.

C. GORDON HEWITT, D.Sc., F.R.S.C., DOMINION ENTOMOLOGIST, OTTAWA.

In welcoming you to the Fifty-first Annual Meeting of our Society, it is my sad duty first to call attention to the deaths, since our last meeting, of two of our former Presidents, one of whom was at the same time one of the founders of the Society, and both have placed us under a deep debt of gratitude by their devotion to the welfare of the Society and to entomology in Canada. I refer, as you will all know, to the deaths of Dr. William Saunders, C.M.G., LL.D., and to Mr. Henry H. Lyman, M.A. Worthy tributes to these two men have been written by a more competent hand than mine in the current volume of our journal,* but I should like to add a few words of personal appreciation.

*Henry Herbert Lyman, by C. J. S. Bethune, Can. Ent. Vol. 46, pp. 221-225. 1914.
Dr. William Saunders, by C. J. S. Bethune, *Ibid* pp. 333-336.

### HENRY HERBERT LYMAN.

The memories of the terrible disaster to the steamer "Empress of Ireland," on the 29th of May last are still acute in the minds of many of us who lost friends and knew the ship; I came out to Canada on her in 1909, and recrossed two years later. To me the feelings of horror were intensified by the fact that I had spent some time with Mr. Lyman on the afternoon of the 27th, when as your Delegate, he attended the meeting of the Royal Society in Montreal and read his report to that Society. His high sense of duty which characterized all his actions was particularly exemplified at that meeting. The afternoon was hot, the time available for receiving reports was very brief, and most of the delegates from Societies presented their reports by title. In view of these circumstances and for personal reasons, for he told me how unusually busy he was preparing for his departure to Europe, I strongly suggested to him that he should hand in his report to be read by title. But no, the report was read in the voice we all knew so well, and the meeting was informed of the manner in which we celebrated our Jubilee meeting. I believe the reading of that report was his last public act, and that I was the last entomologist who performed the duty of an ear for him and conversed with him by means of his scribbling pad; I cannot forget the happy banter of our conversation. He filled a unique place in our meetings, and in entomological meetings which he so zealously attended in other countries, and we shall miss his kindly presence and good-humoured impatience with those who, like myself, presented papers at the meetings without having prepared manuscript which his increasing deafness required as a substitute for the sound of the speaker's voice. At our Jubilee meeting we welcomed his charming wife, and our hope that his constant attendance at our meetings would by her assistance be assured will never be realized. (See Plate, page 8.)

### William Saunders.

The illness which prevented Dr. Saunders from attending the Jubilee Meeting of our Society last year was responsible for his death in September last in his seventy-ninth year. I shall have occasion to refer to his influence on Canadian entomology in my address to you. Those of us who had the privilege of coming into close contact with Dr. Saunders, and of working with him, can understand the reasons for the successful development of all he undertook: his private business as a druggist, the progress of our Society and success of our journal *The Canadian Entomologist* in the early and more difficult days, and finally the organization and development of the Experimental Farms of the Dominion. The last will ever stand as a lasting monument to his enthusiasm and untiring industry. The significance of his work in connection with the development of Canadian agriculture has not been sufficiently recognized by Canadians generally. No man has ever done more, and no single man will ever have the opportunity which he had and of which he took the fullest advantage, to increase the production of the land in Canada. The value of such an accomplishment cannot be reckoned in terms of dollars and cents, it is inestimable; but it is appreciated by those who, in all countries, are striving towards the same ends.

We are concerned with him, however, as an entomologist. He was before all things a lover of nature, and his passion found an outlet in the study of insects and plants. In association with Dr. Bethune he marshalled the scattered workers of kindred tastes and our Society came into being. He was one of the first to realize the practical significance of entomological work, as our records show. In addition to the contributions to our Annual Reports he published in 1883 his "Insects Injurious to Fruits," which for many years was the standard work on the subject, and is now one of our entomological classics. When I undertook, five years ago, the organization of the Division of Entomology under his direction I had ample opportunity of appreciating his kindly thoughtfulness, and though he had grown out of touch with the modern developments of his old science, owing to the exacting demands of other branches of agriculture, his interest in the subject which he had done so much to advance in Canada never flagged, and his reminiscences were always full of interest. His career and industry should be an inspiration to all of us. (See Plate, page 6.)

I have chosen as the subject of my address:

## APPLIED ENTOMOLOGY IN CANADA: ITS RISE AND PROGRESS.

Several reasons have guided me in the choice of the subject of my address as your President. Last year the Society reached the fiftieth year of its existence, and while our proceedings were enriched with delightful reminiscences of earlier years, no record was given of the gradual development in Canada of the economic or practical side of entomology, the growth of which has been so closely associated with the history of our Society. I have already referred to the loss during the past year of one of our founders, Dr. William Saunders, who, with the co-operation of Dr. Bethune, was largely responsible for the early development of our work. Moreover, it was my desire to pay a tribute to the work of these leaders in applied entomology in Canada by describing its growth and present status.

The economic aspect of entomology was first recognized "officially" in Canada in 1856, when the Bureau of Agriculture and Statistics of the Canada of that day,

which of course comprised only Upper and Lower Canada (Ontario and Quebec), offered three prizes of £40, £25 and £15 for the three best essays on "The Origin, nature and habits—and the history of the progress, from time to time—and the cause of the progress, of the weevil, Hessian Fly, midge and such other insects as have made ravages on the wheat crops of Canada; and on such diseases as the wheat crops have been subjected to, and on the best means of evading or guarding against them." The essay was to be designated by a motto. The first prize was won by Prof. H. Y. Hind, Professor of Chemistry at Trinity College, Toronto, whose "Essay on the Insects and Diseases Injurious to Wheat Crops" was published by the Government in the following year 1857, and was widely distributed to the farmers. Whether the agriculturists of that day were impressed by Prof. Hind's motto, history does not relate, but he selected the following extract from a speech of Napoleon III: "The progress of agriculture ought to be one of the objects of your constant care; for upon its improvement or decline depends the prosperity or decline of Empires." Even the suggested relation of insect pests to the decline of Empires did not produce any impression upon the mind of the Government of that day sufficiently great to induce it to do more than distribute the prize money—and the essays, for we have no record of any further official activity until about twelve years later.

Nevertheless, systematic entomology prepared the way for the permanent entrance into Canadian affairs of its practical sister. In 1863 our Society was organized as a result of the activities of the Rev. C. J. S. Bethune and Mr. William Saunders, and I have been fortunate enough to hear the story of its origin and early years from the lips of both of these sponsors, but this story is told elsewhere. It may be remarked, however, that the origin of the Society in Canada may be traced to the publication in the *Canadian Naturalist and Geologist* for June, 1862, of a "List of Entomologists in Canada" by these two gentlemen. This list contained the names of thirty-six persons interested in the study of insects.

The objects of the Canadian Entomological Society were: The formation of a collection of Canadian insects; the charge of a depository of duplicate specimens for distribution among members, and the holding of entomological meetings. It was inevitable that in the course of these mutual studies the members should be concerned from time to time with those species of insects which attracted the attention of other persons than entomologists, and insects of economic importance therefore received attention. In 1865 the Hon. George Brown engaged Dr. Bethune to edit the entomological section in *The Canada Farmer,* and for eight years information on injurious and useful insects was given through this medium to the farmers and fruit growers. Added stimulus to the investigation of the life-histories and habits of insects affecting the agriculturist was given by the determination of the Society five years after its foundation to publish an entomological journal *The Canadian Entomologist,* which came into existence in 1868 and soon began to publish articles of value to the practical entomologist.

The real birth of economic entomology in Canada, in my opinion, took place in 1869 when our Society received a grant of $400 from the Council of the Agricultural and Arts Association of Ontario, on condition that "the Society furnish an Annual Report and form a cabinet of insects useful or prejudicial to agriculture, and horticulture, to be placed at the disposal of this Council, and that they also continue to publish their journal." These conditions were readily accepted by the Society, and accordingly the "*First Annual Report of the Noxious Insects of the Province of Ontario*" was prepared in 1870 and published by the Provincial

Government of Ontario in 1871. It contained three papers on the insects affecting the apple, the grape and the plum, written respectively by Rev. C. J. S. Bethune, Wm. Saunders and L. Baynes Reed. Most of the insects were illustrated. Until a few months ago these pioneers were still with us. We are happy to know that Dr. Bethune is still able to carry on the duties of Professor of Entomology at the Ontario Agricultural College, Guelph, and that Mr. Baynes Reed, though he has transferred his attentions from insects to that still more elusive natural phenomenon, sometimes noxious, generally beneficial—the weather, takes a kindly interest in the work of his successors. The popularity of the first Canadian entomological report is evidenced by the fact that an edition of three thousand copies was soon exhausted.

Further government aid to Economic Entomology was received in 1871, when the Government of the Province of Ontario passed a statute incorporating the Entomological Society of Canada as the Entomological Society of Ontario, which was instituted for "the investigation of the character and habits of insects, the improvement of entomological science, and more especially its practical bearing on the agricultural and horticultural interests of the Province." A grant was made to the society by the Provincial Government, and the *"First Annual Report of the Entomological Society of Ontario"* was published. Without intermission that series of annual reports has been continued, and with the assistance of the government grant, which now amounts to one thousand dollars per annum, our Society has continued to render its services of increasing value not only to the agriculturists of the Province of Ontario but to the Dominion generally: and I feel that I must confess my regret, which is shared by others whose interests are not confined to Ontario, that it was not possible to retain the old name of the Entomological Society of Canada, which the Society virtually is, as it has as affiliated Societies the Entomological Society of British Columbia and a branch in Montreal, and members are to be found in every Province.

Thus we trace the origin of applied entomology in Canada and find that the real stimulus to its development came from the agricultural society (The Agricultural and Arts Association of Ontario). In this connection it is of great interest to note in passing that applied entomology had a similar origin, which preceded ours, in the United States. First in the State of New York and subsequently in Illinois and Missouri the development of entomological work, with which the names of Fitch and Riley are associated, can be traced to the agricultural societies of these States.

We have seen that applied entomology in Canada had its genesis and official recognition in the Province of Ontario. Let us turn to the recognition by the Dominion Government of the fact that the study and control of injurious insects constitutes an integral factor in the development of agricultural and forestry resources of the country.

## Development of Dominion Work.

In 1884 the Minister of Agriculture, (Hon. J. H. Pope), on the recommendation of a Select Committee, and in accordance with recommendations from different parts of the country, appointed a Dominion Entomologist: the position being an honorary one in the first year. Fortunately for the country there was at hand a man eminently suited to undertake such work, and the appointment of the late Dr. James Fletcher, at that time working among books in the Library of Parliament during the day, and among insects during his "spare" and happier moments, was a

most happy choice, for I have reason to know to what extent he endeared himself to all with whom he came in contact, and with what zeal he worked to create in the minds of the agriculturists an interest in insect pests and later, in farm weeds and other plants, for his work became of a dual nature. In 1886 the Dominion Experimental Farms were established, under the direction of an entomologist, the late Dr. Saunders, who continued their direction until 1911. As that was the only scientific branch of the Department of Agriculture at that time, and to increase his sphere of action, Dr. Fletcher was attached to the staff of the Experimental Farms Branch in the joint capacity of Entomologist and Botanist, a position which he occupied until his death in 1908. The uninterrupted series of Annual Reports which he published from 1884 until he died in harness testify to the infinite variety of problems with which he dealt.

Here I wish to digress a little, and in order to indicate in the words of one closely associated with him the character of Dr. Fletcher's work and the conditions which existed until the time of his death, I will quote the conclusion of Dr. Bethune's valuable paper on "The Rise and Progress of Entomology in Canada,"* written in 1898. Concluding a most interesting review of Canadian entomology he says: "Of one other name I must make special mention—that of our much esteemed colleague, Dr. James Fletcher. No one in Canada has done so much as he to instruct the people in a practical knowledge of their worst insect foes and the best means of dealing with them—but how strange it is that he should not be provided with adequate assistance. As Dr. Howard, President of the Association of Economic Entomologists of America well expressed it: 'Canada has the man and the knowledge, but has been hampered by want of funds. The result is that while she has immediately and intelligently adopted the results of researches made in the United States, she has not been able to lead us in original investigations.'" After describing the extent to which entomological work was supported in the United States, particularly at Washington, Dr. Bethune concluded: "Here in this vast Dominion of Canada we have only Dr. Fletcher, with merely one assistant, a secretary to help him in his immense correspondence, whereas he ought to have not only further help in Ottawa but also at least one competent entomologist under his direction in each province and territory from the Atlantic to the Pacific . . . . . It is earnestly hoped that this unsatisfactory condition may soon be rectified, and that entomology, especially in its economic aspect, may no longer be starved in their country, but with liberal aid may make more and more progress in its own field of work, and by its practical results justify all that may be done for it."

Following the death of Dr. Fletcher the entomological and botanical sections of his work were separated, and new Divisions of Entomology and of Botany of the Experimental Farms Branch were instituted. By my appointment as Dominion Entomologist in 1909 it fell to my lot to organize the new Division of Entomology, the staff of which consisted of Mr. Arthur Gibson, as Assistant Entomologist, and one clerk.

The next step in the development of the Dominion work was the enactment of The Destructive Insect and Pest Act in 1910. The San José Scale Act, passed in 1898, concerned itself with one insect only; under the Act ports of entry were determined for nursery stock and fumigation stations were established there. The threatened introduction of certain insects, particularly the Brown-tail and Gipsy Moths, made it necessary that the Dominion should have power to take steps to

*Trans. Roy. Soc. Canada, 2nd Ser., Vol. 4, Section IV; pp. 155-165. 1898.

prevent the introduction and spread of any serious insect pest. These powers were secured by The Destructive Insect and Pest Act, and since its enactment regulations have been passed which have as their direct object the prevention of the introduction of the San José Scale, the Gipsy and Brown-tail Moths, Potato Tuber Moth, Mediterranean Fruit Fly, and Woolly Aphis, and as their indirect objects the prevention of the introduction and spread of numerous other insects whose presence can be detected by inspection or death caused by fumigation. The passage of this Act enabled us to add to the entomological staff gradually a number of trained officers as Inspectors and Field Officers. Additional men have been appointed on the outside staff in connection with the next important development of the Dominion work.

With so extensive a territory to serve involving a great diversity of climatic, soil, topographic, and cultural conditions, with a pressing need for original investigations by trained men of our more serious insect pests in the regions where they occurred, involving the most important feature of all, namely, direct contact with the men whose problems we were studying and whom we desired to assist, an immediate extension of our work along definite and obvious lines was necessary; field or regional laboratories in different parts of the country were required. The first of these was established in the Niagara Peninsula in 1911 for the study of fruit insects. Additional field stations have been established each year until there are now nine stations from the Atlantic to the Pacific* each in charge of a trained entomologist, and the problems that are being studied cover the whole range of applied entomology.

The value of the work of the Dominion field officers in various parts of Canada cannot be overestimated. In most cases they are carrying on pioneer work, studying problems in provinces in which no previous entomological investigations have been carried on, and thus assisting in a most highly important manner in the development of entomological work in hitherto neglected fields. Such missionary work is undoubtedly the most necessary and at the same time the most valuable kind of endeavour to which our efforts can be devoted, and great credit is due to the men who are ploughing the virgin soil.

As a result of this development along special lines both in regard to administrative work and the investigation of entomological problems the Entomological Service was separated from the Experimental Farms Branch in April last and raised to the status of an independent Branch of the Department of Agriculture. The sanction of Parliament to increased appropriations, which are now more in accord with the needs of the country, is encouraging evidence of a desire to afford the means whereby the entomological service of the Dominion shall be in a better position to meet the requirements of the situation. Our greater ability to assist the agriculturists, foresters and others demanding our help in preventing the introduction of insect pests, and in controlling by natural and artificial means the spread of those already within our borders, has been the stimulating factor in our development, and I venture to think that the grounds for Dr. Bethune's earlier reproach which I have quoted have been already removed.

*The Dominion Entomological Field Stations are established at the following points: Bridgetown, N.S.; Fredericton, N.B.; Covey Hill, Que.; Vineland Station, Ont.; Strathroy, Ont.; Treesbank, Man.; Lethbridge, Alta.; Agassiz, B.C.; Vancouver, B.C.

## The Development of Applied Entomology in the Provinces.

It is natural that the study of insects affecting agriculture, using the term as I do in its widest and inclusive sense, should develop early and make the most progress in these provinces in which agricultural methods and practice were most advanced. Accordingly, in tracing the early development of applied Entomology we have seen that it had its birth in Ontario, and forty years ago could be said to have been a sturdy though solitary infant. I now propose to trace the development and to give briefly the present status of applied entomology in the various provinces of the Dominion. We shall find that the impetus to the development of Entomological work in the provinces, as in the Dominion, has been largely due to the necessity of combating serious insect pests which have set foot in the country.

### *Ontario.*

The early history of applied entomology in Ontario has been given, as it alone constitutes the earlier work in Canada. Such advances as were made on the science were entirely due to the activities of our society and of its members. When the headquarters of the society were removed to the Ontario Agricultural College additional stimulus was undoubtedly given to the work of the College in applied entomology. The Entomological Department of the Ontario Agricultural College has always combined with its function as an educator of the agricultural student the duty of assisting that wider circle of students, the farmers and fruit growers of Ontario, in solving their entomological problems. In this latter respect it has been virtually, and still is, the entomological bureau of the Provincial Department of Agriculture. This is certainly the case in so far as the investigations of insect pests and the assisting of the agriculturists and fruit growers are concerned.

Sheer necessity has also helped to develop the entomological work in the Province, and we shall find the same to be true not only in this Province, but in all the provinces in which the control of insect pests is undertaken by the Government, and the same applies to the Dominion. In fact, it is the outstanding feature of the origin of government entomological work that is forced upon the government from the outside usually by an exceptionally serious outbreak, or by the introduction or threatened introduction of an insect, the seriousness of which has been demonstrated by previous experience elsewhere. The most notable example is the San José Scale, which has been the original cause of most of the legislative measures in the United States and Canada.

Following the discovery of the San José Scale in Ontario in 1897, the Provincial Government passed an Act forbidding the importation of infested plants and providing for the inspection of orchards and destruction of infested trees. As a result of the drastic steps which were necessarily involved in energetically carrying out this Act opposition was created, but a Commission of Inquiry supported the policy of the Government, and a further Act was passed in 1899 providing for the fumigation of nursery stock and the inspection of nurseries. This work was at first under the direction of the Professor of Entomology at the Ontario Agricultural College (then Prof. Wm. Lochhead), whose skilful management did much to prevent the spread of the scale in those early days. The Fruit Pest Act was passed in and was amended in 1912. This Act is administered by the Fruit Branch of the Ontario Department of Agriculture. So that the entomological work is now

carried on jointly by the Fruit Branch and the Entomological Department of the Agricultural College, whose teachers direct the work of the inspectors in addition to carrying on the educational and investigatory work in the Province. In 1912 the very necessary step of appointing a Provincial Entomologist was taken, and Mr. Lawson Caesar, who had carried on for several years the duties of such an office with commendable zeal and success was appointed to the position. His recent promotion to be Associate Professor of Entomology in the Agricultural College is a deserved reward for the excellent practical work which our fellow member is carrying on. I have no hesitation in saying that the provincial entomological organization in Ontario, under Professor Caesar, who directs an excellent staff of inspectors, will not suffer from comparison with similar services in the states to the south of us.

*British Columbia.*

As early as 1887 the Rev. George W. Taylor, whose subsequent reputation as an entomologist was by no means confined to this country, was appointed Honorary Provincial Entomologist of British Columbia, but I am inclined to believe that the duties were more along the lines of systematic than applied entomology. Owing no doubt to the fact that a considerable proportion of the people who settled in the Pacific coast province came out from England, and because of the rich and attractive insect fauna which was discovered there, we find that entomology has always had a number of zealous devotees in the province, among whom may be mentioned the names of Taylor, Harvey, Hanham and Day. In spite of the temporary suspension in 1908 of the activities of the British Columbia Entomological Society, which was started in 1901 and affiliated with out society in 1905, the interest in entomology did not die out, for the society was resuscitated through the energetic efforts of Mr. R. C. Treherne in 1911.

During this period a change in the public estimation of entomology in the province has been brought about. Formerly it signified the collection of insects and their study; now it involves not only this systematic aspect but a consideration of the practical bearing of insect life upon human activities. I have no hesitation in saying that with the co-ordination of these two independent sections of entomological work entomology in British Columbia has a firm establishment, and the present growing society will not suffer the fate of the former society, which had not the same amount of human interest in the subject.

For this entomological revival in British Columbia much credit is due to Mr. Treherne, who, as an officer of the Dominion Entomological Service, was sent out to take charge of the work in that province in 1911, and in 1912 commenced a series of investigations at the Dominion Entomological Field Station established that year at Agassiz.

The applied entomological work of the Provincial Government has, until a year or two ago, taken the form of the administration of legislation having for its object the prevention of the introduction of insect pests into the province. Great praise is due the Province for its activities in this important direction. Following the organization of the fruit-growers about twenty-five years ago, the Provincial Government passed the Horticultural Board Act in 1894, under which a Provincial Inspector of Fruit Pests was appointed. This officer's duties were somewhat extensive; they were educational, in that he was required to "hold meetings throughout the Province in the interests of horticulture and impart such information and

instructions to fruit-growers and farmers as may tend to the improvement and expansion of the fruit industry of the province." In addition (and this, as this title would indicate, has proved to be the chief duty of the officer), the Inspector of Fruit Pests was required to carry out the Board's regulations relating to the prevention of the introduction and spread of insect pests and plant diseases. The first inspector was Mr. R. M. Parker. It is largely due to the zeal and extraordinary enthusiasm of the present Inspector of Fruit Pests, Mr. Thomas Cunningham, that the Province is so remarkably free at the present time from such orchard insects as the Codling Moth and San José Scale, to mention the most important, when other newly-developed regions have succumbed to their invasion. The work is now carried out under the Agricultural Associations Act of 1914. Formerly the fumigation and inspection of imported nursery stock and plants was carried on by the Dominion and Provincial Governments at Vancouver, but the duplication of work which necessarily followed has been abolished by an arrangement whereby compliance with the Dominion regulations is effected by the Provincial Inspectors of Fruit Pests under the supervision and with the co-operation of the Dominion Department of Agriculture, and the system is working admirably.

In passing, mention should be made of the entomological work of Mr. J. R. Anderson, formerly Deputy Minister of Agriculture, who has always been a keen observer and has assisted in the development of applied entomology in the Province. His bulletin on "Farmers' Foes and Their Remedies," published in 1908, has done much to create an intelligent interest in the subject of insect pests in the province.

In the spring of 1912 Mr. W. H. Brittain was appointed Provincial Entomologist and Plant Pathologist under the Fruit Branch of the Department of Agriculture, but his removal to Nova Scotia in 1913 caused a cessation of the investigations on fruit insects which he had started, and which, with those carried out by the Dominion Field Officer, Mr. Treherne, constituted the first serious efforts on the study of practical entomological problems in the province.

I should include in this statement the investigatory work of Dr. Seymour Hadwen, of the Health of Animals' Branch of the Dominion Department of Agriculture, who in the course of his study of animal diseases has been able to carry on entomological work on insects affecting live stock, which studies have been productive of excellent results, his work on the Warble flies (*Hypoderma* spp.) and ticks being particularly important.

The provincial entomological work, apart from the inspection work under the Provincial Horticultural Board, is being carried on at present by the Provincial Plant Pathologist, pending, I venture to hope, the appointment of a Provincial Entomologist, upon whom will devolve a large amount of highly important work as British Columbia has many problems peculiar to itself.

### *Nova Scotia.*

Although Nova Scotia is one of our oldest provinces where educational facilities have always been exceptionally good, we do not find any early development of practical entomology; indeed, the number of collectors in the province has never been so great as one would expect. From the establishment of the Provincial Agricultural College, Truro, until 1912, Prof. H. W. Smith, Professor of Biology, undertook any local entomological work that might be required, such as replying to enquiries regarding the control of insect pests, chiefly those affecting fruit, and

attending meetings of fruit-growers and agriculturists. He also contributed articles on applied entomology to the *Annual Report of the Provincial Department of Agriculture.* In 1900, following the activities of the Dominion and Ontario Departments of Agriculture, the Provincial Government passed a San José Scale Act, but no enforcement of the provisions of the Act were required.

The necessity of possessing wider powers, indicated by the introduction of the Brown-tail Moth, led to the passage of the Injurious Insect Pest and Disease Act in 1911. This Act was more comprehensive and enables the Provincial Department of Agriculture to appoint inspectors and to take the necessary steps to prevent the introduction of and eradicate insect pests. This measure was passed none too soon, for in 1912 Mr. G. E. Sanders, of the Dominion Entomological Service, discovered San José Scale in the province, into which it had been introduced on nursery stock from Ontario. It is an ill wind that blows no one any good, and again the discovery of a serious insect pest led to necessary progress in applied entomology. Not only did the Nova Scotian Government appoint a Provincial Entomologist in 1912, in the person of Dr. R. Matheson, but the Ontario Government recognized the need of such an official to have charge of the nursery inspection. Dr. Matheson organized an inspection service, and it is largely due to the energetic measures taken by him in eradicating infested trees that the Scale has been pratically exterminated in the Province. Dr. Matheson returned to Cornell University in 1913, and was succeeded by Mr. W. H. Brittain, who now occupies the position of Provincial Entomologist and Professor of Entomology in the Provincial Agricultural College.

In addition to the San José Scale inspection work carried on by the Provincial Department of Agriculture, the Province co-operates with the Dominion Department of Agriculture in the work against the Brown-tail Moth, for which work the latter Department is responsible, by supplying an equal number of inspectors to those employed by the Dominion.

The prospects for applied entomology in the Province are unusually bright; there are many important problems awaiting solution and much educational work is necessary. Already the joint efforts of Mr. Brittain and the Dominion Field Officer, Mr. G. E. Sanders, who has charge of the Brown-tail Moth work in the Province, have had a marked effect, particularly in the direction of increased efforts on the part of the fruit-growers, not only to control insect pests but to do so intelligently.

*Quebec.*

While insect pests have not spared the fields and forests of Quebec during its development, the progress of ideas in regard to the scientific control of insect pests has been slow. Although the Abbé Leon Provancher was a most industrious student and a prolific worker on the insects of Quebec, he did not concern himself with the practical application of entomological knowledge, but confined his attention to the collection and classification of insects of the Province, in which work he persevered in spite of lack of access to literature and other collections. The results of his efforts are evident in the pages of "*Le Naturaliste Canadien,*" which he founded in 1869, and in which he commenced his "Faune Entomologique du Canada" in 1874, which he completed in 1890, two years before his death.

Prior to the establishment of Macdonald College, in 1907, and the location of a Dominion Entomological Laboratory at Covey Hill, Que., in 1912, I do not know of any investigations on insect pests. For a number of years, however, Mr.

J. C. Chapais, of St. Denis en Bas, has taken advantage of his journeys through the Province as Assistant Dairy Commissioner for the Dominion Department of Agriculture to disseminate useful information regarding the control of insect pests affecting agriculture, and his pioneer work in this direction is deserving of much credit.

Valuable educational work was also carried on in the Province, particularly in the Eastern Townships, by the Rev. T. W. Fyles, who, in 1880, was awarded a prize by the Missisquoi Agricultural Society for an essay on "How to Guard against the Ravages of the Potato Beetle, Locust, etc.," which was subsequently published in the Provincial *Journal of Agriculture*. By his charming popular writings and exhibits of insects he has done much to create an interest in entomology in the minds of those who would be benefited by its practical application. As a society we are pleased that, in spite of his increasing years, he is still able to take part in our deliberations and to contribute to our Proceedings.

The establishment of the MacDonald College, at St. Anne's, in association with McGill University, brought Prof. Wm. Lochhead and a staff of enthusiastic workers who have taken the most prominent part in the arduous task of developing the study and practice of applied entomology in the Province. In 1908 Prof. Lochhead founded the Quebec Society for the Protection of Plants from Insect Pests and Fungous Diseases, which receives a grant from the Provincial Department of Agriculture to enable us to carry on the valuable and very necessary educational work in the Province. The wide range of subjects and useful character of the practical information contained in the six annual reports of the Society which have been published up to date indicate the important part it is playing in the development of applied entomology in the Province.

The Department of Agriculture of Quebec realising the necessity of safeguarding the interests of its nurserymen and fruit-growers appointed a Provincial Entomologist in 1912, the Abbé V. A. Huard, Curator of the Provincial Museum at Quebec, and editor of "*Le Naturaliste Canadien*," being selected for the position and in 1913 an Act was passed providing for the inspection of nurseries and giving the Provincial Entomologist the necessary powers to make such inspections and issue certificates. We are looking forward with interest to the development of the practical side of entomology under the Provincial Department of Agriculture, the Fruit Branch of which is displaying commendable activity in connection with their work in demonstration orchards.

Before this review of work in Quebec is closed reference should be made to the educational work that is being carried on in certain of the educational institutions in which, as our correspondence indicates, there is a growing interest in entomology. Particularly should the energetic efforts of Father Leopold, of the Trappist Agricultural College at Oka, P.Q., be mentioned in this connection, as his influence will be widespread in directions in which information on the scientific control of insect pests is sorely needed.

### *New Brunswick.*

For a number of years Mr. Wm. McIntosh, Curator of the New Brunswick Natural History Society's Museum at St. John, N.B., has carried on pioneer work of an educational character in the province, particularly in the schools, and he has assisted the Provincial Department of Agriculture in entomological matters from time to time. Particularly valuable has been his educational work since the estab-

lishment of the Brown-tail Moth in Canada. The work of Mr. R. P. Gorham, Assistant Horticulturist in the Provincial Department of Agriculture, is also deserving of mention.

Since the field work against the Brown-tail Moth was commenced in the Province by the Dominion Entomological Service in 1911, the Provincial Department of Agriculture has co-operated in the work by providing half the staff of inspectors required, this excellent plan being followed in both the infested provinces, Nova Scotia and New Brunswick. A further necessary step was taken by the Province in 1913, when an "Injurious Insect and Pest Act" was passed giving the Provincial Department of Agriculture powers to take the necessary steps to prevent the introduction and spread of serious insect pests and plant diseases.

*Manitoba, Saskatchewan and Alberta.*

In the three prairie provinces the agricultural conditions are probably responsible for the fact that, except for occasional serious outbreaks of locusts or cutworms which have been of the usual duration, there has been no insistent demand for entomological work. With the adoption of more diversified methods of farming and the necessity of increasing the production and discontinuing "mining" the soil, greater attention must be paid to the methods of insect control. The farmers in these provinces have looked to the Dominion Department of Agriculture for assistance and have been well served. The establishment of field stations in southern Manitoba and southern Alberta for special investigations indicates the intention of the Dominion Government to assist the agriculturists of the West. Notwithstanding the fact that no official Provincial Entomologists have been appointed in the prairie provinces, there are a number of men who have had a marked influence on the progress of applied entomology in that important section of the country.

In Manitoba Mr. Norman Criddle has studied the native injurious insects for many years. His work first came to the notice of Dr. Fletcher in 1901. Not only has he become widely known to the farmers of Manitoba through his contributions to the agricultural press, but his investigations have been productive of results of practical value. His remedy for locusts, now well known as the "Criddle Mixture," has proved of immense value. His appointment in the Dominion Service to carry on investigations in Manitoba is a deserved recognition of his ability, and an important step in the direction of assisting the grain growers in the control of insects affecting cereals. Prof. F. W. Brodrick, Professor of Horticulture at the Manitoba Agricultural College, Winnipeg, Man., has also taken a keen interest in entomological work, and he and Prof. V. W. Jackson, Professor of Botany, have done much to extend a knowledge of the control of insect pests among the students and agricultural community in the province. I understand that the establishment of an Entomological Department in the Agricultural College, with a competent man in charge, is contemplated: such a forward step would be in every way desirable and justified.

Throughout Saskatchewan the name of Mr. T. N. Willing, Associate Professor of Natural History in the Saskatchewan Agricultural College, Saskatoon, is known for his educational work among the farmers. By lectures at Institute meetings and exhibits of injurious and beneficial insects he has performed a real service to the agricultural community. Previous to his present position Mr. Willing held the position of Chief Inspector of Weeds for the Department of Agriculture in Sas-

katchewan, and combined with the botanical work such entomological propaganda as he was able, all enquiries respecting the control of insect pests being referred to him.

In the Province of Alberta there existed some years ago the North-West Entomological Society, which had for one of its objects the dissemination among the agriculturists of information relating to the control of insect pests, and its President, Mr. P. B. Gregson, of Waghorn, was particularly active in this aspect of the Society's work. I do not think the society exists at the present time, although there are several entomologists in the province, of whom Mr. F. H. Wolley-Dod is well known on account of his work in Noctuidæ. The Provincial Department of Agriculture of Alberta has not taken any steps in the direction of educational or other work regarding the control of insect pests.

No action has been taken by the Provincial Government of Prince Edward Island regarding entomological work.

In briefly touching upon the various phases of the progress of applied entomology in the provinces nothing has been said concerning a number of agencies not entomological, all of which have helped in the general development of entomological work among the agriculturists. Such agencies are the Farmers' Institute meetings, agricultural fairs, demonstration orchards, district representatives, the more recent "Better Farming" special trains; all of these varied activities, through the zeal of those who have charge, have and will have in an increasing measure a potent influence in developing our science.

No one is more conscious of the rambling nature of the foregoing account than its writer, but if the description appears to lack co-ordination, like the solitary efforts of those who have been the pioneers in our work in Canada, you cannot fail to observe the single motive which runs through all the efforts—an unquenchable desire to place scientific knowledge at the disposal of those who will profit by its application to the advantage of the country at large. Entomologists are sometimes wont to resolve themselves into two main classes: the systematists, who collect and classify, and the economic entomologists, who study how to control species affecting man in his varied activities. Occasionally I have heard the former section speak somewhat disparagingly, even scornfully of those who apply their knowledge to every day life; on the other hand, a reversal of such opinions is sometimes heard. We need not concern ourselves with the opinions of those who collect insects as they would stamps or china, but I would remind those systematists who are inclined to hold aloof from the practical application of their science that to the work of economic entomologists they owe almost entirely that large measure of respect with which entomologists and entomological work is now regarded by the general public. The prevention and eradication of diseases carried by insects and the control of insects which have devastated our forests and crops and depopulated whole districts is regarded as work indispensable to national development. Such work has led people to appreciate the value of entomological work to humanity at large, and incidentally to recognize that there is no ground for the assumption that a man with a net is to be pitied, or, as in one instance that came to my knowledge, confined to the local gaol as insane. Applied entomology is, as its name applies, science with practice. It was preceded by the study of the science for its own sake, and such a study must necessarily furnish the basis for all entomological work that is to be of practical value. The pioneers of applied entomology in Canada were all men who loved the science of entomology primarily for its own sake, and not on account of the practical value of the knowledge they

gained regarding insects. When they were able to put their knowledge to a practical purpose and to take up its application they did so with untiring zeal. This is the lesson taught by a study of the subject of my address, and in directing your careful attention to it I would urge the necessity of our emulating the example of the founders of applied entomology in Canada. Let it be our constant endeavor in developing the work of our society and of our work in Canada to recognize the need of, and endeavor at all times to secure the closest co-operation between the man who collects and studies our insects for the mere pleasure of gaining the wonderful and unequalled insight into nature that it gives and the man whose studies lie in the laboratory and in the field and forest. With such co-operation there can be no doubt as to the place which entomology in Canada will occupy.

Dr. Bethune: We have all, I am sure, listened with the greatest possible interest to the admirable address which Dr. Hewitt has just given us. It is certainly the most complete and exhaustive history of the rise and progress of economic entomology which has yet been prepared in this country, and I think we all must feel that we owe a very hearty vote of thanks to Dr. Hewitt for his successful efforts in this respect. Dr. Hewitt has come in at the end of the first period of history in this respect, and we may look to him with the greatest confidence to carry on and develop to a far greater extent than we who belong to the earlier period ever dreamed of, this work of economic entomology in Canada, and to mature the systematic side as well. The two cannot exist satisfactorily away from each other, and there must be this co-ordination to which he has referred in order that we may have success in both directions and in the important field of economic entomology.

Dr. Fyles: We have all listened, I am sure, with the greatest pleasure to the able and stimulating address that Dr. Hewitt has given us, and we all feel, I am sure, that the Government has the right man in the right place. It is indeed a great thing to have a man who brings it before us in such an able way, and urges men to carry on works which are now being undertaken to develop practical entomology as Dr. Hewitt has done. I am sure we all feel that he is entitled to our warmest thanks, and while we feel this, at the same time it is a great pleasure to us to see our friend Dr. Bethune, our old President, the Editor of our paper for so long a time, present amongst us and occupying the chair, and while we are sorry that several old friends have passed away, as some of our dear friends have lately done, it is a source of rejoicing that we still have Dr. Bethune amongst us. Long may he continue his services to the Entomological Society of Ontario. We are glad to see younger men coming up and doing the work in such an able way as so many of the younger men are carrying on the work in distant parts of the country for the general good. I beg to second the vote of thanks that Dr. Bethune has proposed to Dr. Hewitt, and hope that he may long continue his work with his able assistant Mr. Gibson. If you go to the new apartments of the Department of Entomology in Ottawa, and go upstairs in one of the towering buildings which men are putting up in these days, you will find large rooms there devoted to our favourite science, and there you will find Dr. Hewitt and Mr. Gibson ready to afford you all information in their power and to show you very valuable collections that are there gathered.

The President: I thank you all for your very cordial and most encouraging reception of my paper and for Dr. Bethune's and Dr. Fyles' encouraging words, and I only hope, as I endeavoured to show in my paper, that it is upon the wonderful example of our founders, particularly that of Dr. Bethune, that we are basing our efforts, and hope as best we can to follow that example in the development and progress of our work in Canada.

# INSECTS OF THE SEASON IN ONTARIO.

L. Caesar, O.A. College, Guelph.

## Orchard Insects.

Most of our common orchard insects, such as Codling Moth, Plum Curculio, Bud Moth, Case-bearers, Blister Mite, Round-headed Apple-tree Borer, and Pear and Cherry Slugs have scarcely done so much damage this year as usual; at any rate, no complaint of difficulty in keeping any of them under control has reached me.

Tent-Caterpillars (*Malacosoma americana* and *M. disstria*) were again abundant in the eastern part of the Province, and the former has spread westward throughout a large part of the Province. In the east, however, neither species was quite so numerous as usual, and, according to the reports of district representatives and others, many caterpillars died before pupating, indicating probably that they were attacked by disease. In July, I examined numerous cocoons of *disstria*, the more common species, and observed that 90 per cent. of them were

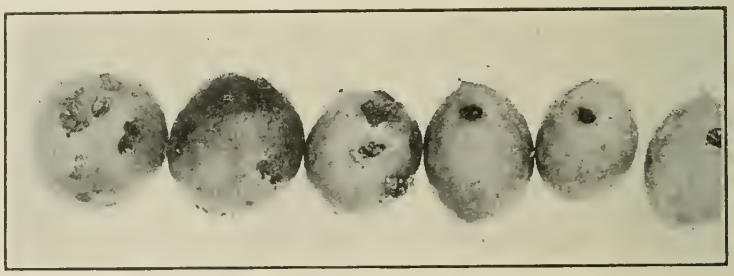

Fig. 3.—Work of Plum Curculio (*Conotrachelus nenuphar*).

infested by a tachinid larva. There are fewer egg masses of both species this fall in the east than last year, and many of these masses have the surface roughened as if injured in some way. It is probable that the long siege of Tent-caterpillars is about at an end. Lime-sulphur applied as the eggs are hatching proved once more an excellent remedy, even without any poison.

San José Scale (*Aspidiotus perniciosus*). The last two seasons with their long warm autumns have given the scale a wonderful chance to increase rapidly in infested orchards. This pest has not, however, so far as known, spread much since our last report, though it has been found in several new places in districts where we suspected it might be. A more vigorous campaign than ever is being carried on against the pest. The chief trouble in control is to get trees thoroughly sprayed.

A large number of parasites were imported in September from Pennsylvania and were distributed in various places in Niagara district and in Essex County. More will be forwarded from the same State next spring. Seven small twigs, averaging 4½ inches long and ⅕ of an inch in diameter, were reserved and placed in breeding jars. Parasites continued to emerge for one month from date of sending. About 80 individuals were obtained, nearly all of these being *Prospaltella perniciosi*, Tower. It is hoped, therefore, that a large number of these parasites have become established in the orchards, especially as the weather was warm and fine for considerable time after they arrived.

Aphids. The injury from these has, on the whole, probably not been so great as usual, but there have been some exceptions. It seems that orchards and nurseries situated near the great lakes and influenced by the moist, cool breezes are much more severely infested than those further inland. In the control of aphids 10 lbs. soluble sulphur and 4 lbs. common laundry soap to 40 gals. water, applied as soon as the eggs have all or almost all hatched, promises to be the cheapest remedy. This will burn if the buds have opened and the leaflets appeared. Black-leaf 40 and lime-sulphur is also good but more costly.

Apple Curculio (*Anthonomus quadrigibbus*). Injury to apples from this insect can be found here and there all over the Province. It seems to be worst in the eastern part. One orchard at Mountain, twenty-five miles from Ottawa, showed in September, 50 per cent. of the Tolman Sweets deformed by punctures. Doubtless many more apples had dropped off early in the season.

Capsid (*Neurocolpus nubilus*). The nymphs of this Capsid were found on June 16 in large numbers in a forty-acre orchard in Norfolk County attacking

Fig. 4.—Work of Apple Curculio (*Anthonomus quadrigibbus*).

a block of Spy trees. Approximately 50 per cent. of the apples were attacked, though some of them were not permanently injured. At this date the apples were about two-thirds of an inch in diameter, so that they had reached the stage where the nymphs were ceasing to feed on them and were attacking the tender leaves and stems of shoots from main branches and of the suckers that sprang up from the crown. This part of the orchard was in grass but it is not probable that this accounts for the presence of the pest. In 1912 I reported a similar injury from this species to Spy apples at Woodburn, not far from Grimsby.

The nymphs are light green, interspersed with brown or reddish brown. The antennæ are very conspicuous. They are longer than the body, reddish brown with alternating broad white rings. The occurrence of numerous black capitate hairs give to the second joint especially a swollen appearance. The adults are about the size of the Tarnished Plant Bug (*Lygus pratensis*) but are somewhat longer and narrower. The general dorsal colour is brown mottled with black with a reddish area near the costal margin of the upper wing just in front of the membrane. The antennæ are longer than those of *L. pratensis*, and have the basal segment longer, thicker, and covered with black capitate hairs.

Fig. 5.—Moths of Fruit-tree Leaf-roller (*Archips argyrosphila*), about natural size.

Fig. 6.—Work of Fruit-tree Leaf-roller on Young Apples, natural size.

Fig. 7.—Work of Fruit-tree Leaf-roller on Apple Foliage.

Fruit-tree Leaf-roller (*Archips argyrosphila*). In the above Norfolk orchard, and in the very same part of it, the Spy apples were severely attacked by this leaf-roller. The insect did not confine its attack to the fruit but riddled numerous leaves as well, especially all over the top of the trees. It was estimated that at least 40 per cent. of the apples had been injured. The larvæ feed on the fruit from the time it begins to form until it is about two-thirds of an inch in diameter. Irregular holes are eaten into it, and, when these callous over, they leave the apple badly deformed in many cases.

In our cages the moths began to emerge the third week in June. In the orchards in the eastern part of the Province moths were seen as late as July 17th. Eggs are laid in small brown clusters on the twigs and evidently hatched in Norfolk about the time the blossoms fell from apple trees. The winter is passed in the egg stage. There is only one brood a year. The insect has been found in such widely distributed portions of the Province that it is now present probably in all or nearly all the apple districts. In several localities in New York and several other States, it has caused serious loss to apple growers. It is a very difficult pest to combat as the ordinary Codling Moth spray does not control it. Possibly heavy applications of double strength arsenate of lead would do so. Experiments by the Washington, D.C., investigators indicate that these give moderately good results. We need not be surprised if there are several serious outbreaks next year as there are many eggs, at least in the Norfolk orchard.

Pear Psylla (*Psylla pyricola*) was abundant in a few orchards while nearby orchards had almost none. The time of spraying probably accounts for the difference.

### Grapes and Bush Fruit Insects.

Grapevine Flea-beetle (*Haltica chalybea*). This beetle was more common and injurious to the bursting buds this year than I have ever seen it before.

Rose Chafer (*Macrodactylus subspinosus*). There were probably on the whole about the usual number of these beetles but at Fonthill in a neglected vineyard they were so abundant that almost all the grape clusters were destroyed.

Blackberry Leaf-Miner (*Metallus bethunei*). This insect has been referred to several times in reports as infesting severely Blackberry leaves. A few weeks ago Dr. McGillivray stated in the "*Canadian Entomologist*" that it was a new species and gave it the above name. The life history, as observed, is as follows: The winter is passed in the larval stage in the ground an inch or so below the surface in a small oval earthen cocoon. Adults appear in July and lay their eggs beneath the epidermis of the leaves. The larvæ from these become mature early enough for a second brood, some larvæ of which may be found in the leaves even up into November. The insect does not seem to be so abundant this year as usual.

The Raspberry Sawfly (*Monophadnoides rubi*) was very common in Niagara this year.

The Currant Stem Girdler (*Janus integer*) was found at St. Catharines by my assistant, Mr. J. Shipton. This little-known insect has now been reported from Lambton, Wentworth and Lincoln Counties. It has not done a great deal of damage anywhere, so far as known.

### Vegetable, Cereal and Fodder Insects.

The Pea Aphis (*Macrosiphum pisi*) has caused much injury to late peas, especially in Prince Edward County and the counties along the southern part of Lake Huron. Early peas in most cases escaped.

The Army Worm (*Heliophila unipunctata*) which was so abundant this year, has been dealt with by Mr. Baker in a separate paper.

Grasshoppers (*Melanoplus atlanis, M. femur-rubrum,* and *Camnula pellucida*) were very abundant in a number of localities, especially in old pastures and waste places. The new Kansas remedy was used with excellent results and can be highly recommended. Results should not be looked for until two or three days after the application. Beekeepers feared injury from this sweetened poison, but field observations and experiments showed their fears were not justified.

## Garden and Greenhouse Insects.

Millipedes. The last few years an increasing number of complaints of injuries to garden plants from these have been sent in. It would be a boon to learn of any simple and effective remedy.

Tarnished Plant-Bug (*Lygus pratensis*). This insect is a great foe to growers of dahlias as it punctures and destroys the blossom buds. A remedy is badly needed.

The Greenhouse Leaf-Tier (*Phlyctænia ferrugalis*). The caterpillar of this small brown moth seems to be quite abundant in some greenhouses, and so far as my experience goes, is most common on Chrysanthemums, the leaves of which it ties together and feeds upon.

Rose Leaf-Hopper (*Typhlocyba rosæ*). It is remarkable how many roses have their foliage injured by this little pest. Tests with soluble sulphur—2 lbs. to 40 gals. water—and with lime-sulphur, 1.010 specific gravity, and also with Black-leaf 40 and a small quantity of soap, showed that any one of these would control the pest if applied in May before the nymphs had become full grown.

## Forest and Shade Tree Insects.

The Bronze Birch-Borer (*Agrilus anxius*) has during the last two seasons destroyed many beautiful European Cut-leaved Birches in the neighbourhood of Guelph.

*Cryptorhynchus lapathi* is in several parts of the Province doing much injury to some species of swamp willows, and in some cases to some of the so-called weeping willows on lawns.

The European Fruit-Lecanium (*Lecanium corni*) has again become very abundant, especially in a number of forest trees. It is, however, becoming heavily parasitized.

The Cottony Maple Scale (*Pulvinaria vitis*) was abundant on soft maples at Guelph this autumn, but is heavily parasitized by *Coccophagus lecanii* Fitch.

## Addenda.

Glassy Cutworm (*Hadena devastatrix*). Since writing the above, specimens of this cut-worm have been sent me from Grey County with the statement that much damage is being done to winter wheat in fields that were not ploughed early but late, or comparatively late. The larvæ at this date (November) are for the most part, about one inch long, though a few are an inch and a half.

Prof. Caesar: I should like to hear from Prof. Crosby on the Tarnished Plant Bug, and how to control it.

Prof. Crosby: In regard to the Tarnished Plant Bug, in Rochester where it is a great pest in nursery stock, I think that in that region at least, the injury to peach buds is caused almost entirely by this insect, though in other portions of the country it may be caused by something else. I have never been able to find there a mite doing any perceptible injury. We worked on this question last year, and the results were published in the winter. This summer we continued our work with the same results as before. We did not succeed in doing anything to prevent their injury or destroy the bug. This summer we surrounded a portion of the peach block with a six foot wire screen fence of the ordinary mesh

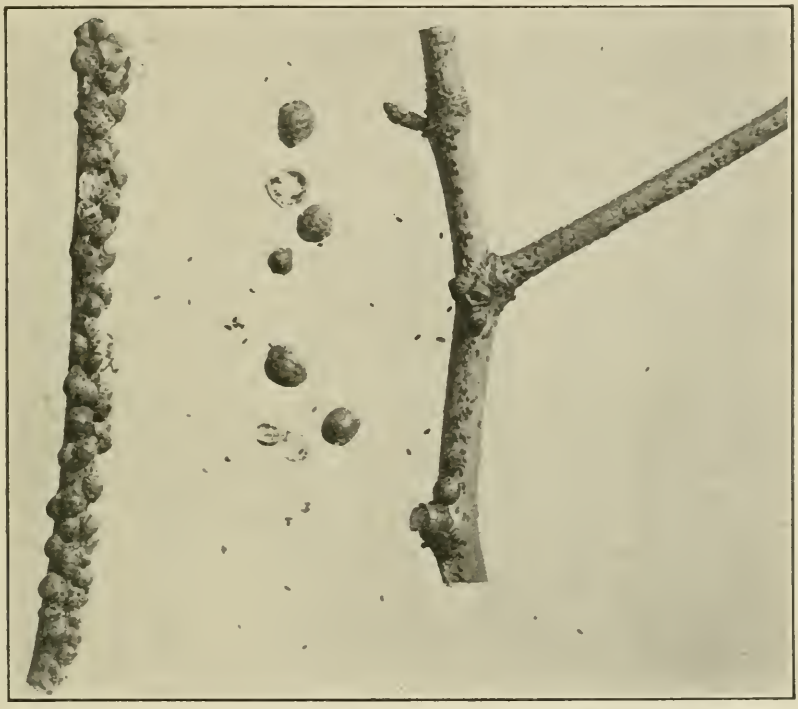

Fig. 8.—European Fruit Lecanium Scale (*Lecanium corni*). On the left are the full-sized scales, some of them with holes from which parasites have emerged. On the right is the winter stage of the scale. The tiny scales or specks in the centre are also winter stage that were removed from the twig. Note the small size of this stage compared with the adult scale.

we have on windows. A few observations we made last year led us to believe that they would not fly over such a fence to any extent. We also put a band of tanglefoot round the top. We found that a great many would walk over the tanglefoot quite easily while other insects got caught. Some flew over. There are many high winds there, and by the end of the season of injury, which was about the middle of July, there were as many stung nursery trees inside the fence as outside. We also had the idea of putting paper bags on the top of the trees to prevent injuries. We had to put the bags on so early in the season that the trees were too tender and would bend over with the weight of the bags. That had to be abandoned. Finally we thought we might be able to help the trees overcome the injury by a system of summer pruning. The results of this

have not been ascertained yet. I do no not think that we have as yet found any practical means of preventing in any way the injury from this insect to peaches. In the matter of injury to asters, we found that when grown in the shade of apple trees in old orchards, they would give the best results.

PROF. CAESAR: I think it would be very interesting if we were to hear from Prof. Brittain in regard to the Capsid attacking the apples down in Nova Scotia.

PROF. BRITTAIN: Last winter when I was going round the Province, everybody was asking me what caused the woody pears. Some said it was due to the iron in the soil or something or other which made their appearance woody, so that when one tried to eat them it hurt one's teeth. I did not have the slightest idea then what they meant, but this is what it was. These are pears that are affected by a plant bug which has been determined as *Lygus invitus,* the False Tarnish Plant Bug. They were extremely numerous in Nova Scotia this year, and caused immense damage to apples and pears. In pear orchards the injury is more conspicuous, because they cause quite a good sized corky area to appear on the surface of the pears, and this corky area or hard woody area extends into the pulp, and makes it unfit for eating as well as unsightly. When the pears are first punctured, a little drop of exudate oozes out, and finally the injury becomes larger and hard and woody, rendering the pears unfit for human consumption. If the apples are attacked when small they invariably drop to the ground, but if attacked a little later there is considerable malformation and the fruit is no good. It also works on the tender growing shoots. When the insect stings these shoots and the growth takes place rapidly, it makes large marks. It is hard to realize that it is possible for the marks to be caused by the puncture of so small an insect. The marks are of such a size that they can quite easily be photographed. In one orchard of which I am thinking they were very numerous. It was a particularly well-cared-for orchard, and the best sprayed orchard in Nova Scotia, and the insects were so numerous that the leaves looked as if they had been punctured full of holes. On looking it over, a careful examination showed that the trees were literally swarming with nymphs of the Plant Bug, millions on every tree. Simply by standing near and pointing one's finger at the branch or twig all the nymphs would come around to look at your finger, and when they had sized you up, they would suddenly drop to the ground. The farmers never suspected that there was anything like that present. There was only one man who did, and he was a very careful observer. I heard one man giving directions to a foreman not to kill the red bugs with black spots on the wings, because they ate the bugs that were doing the damage, and on no account to disturb them. He was referring to the nymphs of this Plant Bug. This insect is practically everywhere, and the farmers all complain of woody pears. On one occasion I knew of a negro who took an axe and cut down all the trees, because as he said they all grew woody fruit and were no good.

PROF. LOCHHEAD: Have you noticed that these deformed apples may appear on a single branch of a tree. I have come across some of these apples deformed to various extents. Some are only slightly deformed and others badly. Some being confined to a single branch. I could not find any bug and did not know what to do. Those who knew most about botany said that it was a case of Bitter Pit, while those who knew most about entomology said that it was some Capsid.

PROF. BRITTAIN: I have seen these deformed apples on only certain branches, but am in doubt in the case I have in mind whether this is really due to an

insect or to a form of the Bitter Pit disease. The Bitter Pit disease will occur on isolated branches of a tree with only a half dozen fruits on it while the next tree may have a whole lot of fruit on it and no disease at all. The Bitter Pit disease can be told by putting a cut through, and seeing the brown areas.

Prof. Crosby: The more insects there are, the more a tree will be affected. This year in New York, we have more red bug injury than ever before. The increase in the injury until this year I attributed to greater attention being given to the matter, but there is a real increase in red bug injury this year.

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## PUBLIC MEETING.

On Thursday evening, a public meeting was held in the Lecture Hall of the University Biological Building, and was well attended, many members of the university staff and those of the various collegiate institutes and of the Royal Canadian Institute having been noticed in the audience.

The President, Dr. Hewitt, introduced the lecturer, Prof. J. H. Comstock, of Cornell University, who gave a most interesting and stimulating address on "The Habits of Spiders," a subject upon which there is probably no one more competent to speak.

## THE HABITS OF SPIDERS.

J. H. Comstock, Professor of Entomology, Emeritus, in Cornell University.

Professor Comstock's address was a popular account of the habits of spiders, and was illustrated by many lantern slides of extraordinary beauty made from his photographs of the various types of webs and nests of spiders and of original figures illustrating the structure of these animals. The address began with the following statement:—

"Of all our little neighbours of the fields there are none that are more universally shunned and feared than spiders, and few that deserve it less. There is a wide-spread belief that spiders are dangerous, that they are liable to bite, and that their bites are very venomous. Now this may be true of certain large species that live in hot countries; but the spiders of the Northern United States and of Canada are practically harmless."

"It is true, spiders bite and inject venom sufficient to kill a fly into the wound made by their jaws. But they are exceeding shy creatures, fearing men more than they are to be feared. If an observer will refrain from picking up a spider there is not the slightest danger of being bitten by one; and, excepting a single uncommon species, no spider is known in this part of the country whose bite would seriously affect a human being, and the venomous nature of this species is not established."

"On the other hand, spiders do much to keep in check various insect pests, and hence must be regarded as our friends. It is, however, from a different point of view that I wish to consider them at this time. It is as illustrations of remarkable development of instinctive powers, and of wonderful correlation of structure and habit. The student of nature can find no more available or more fertile field from which to make interesting subjects for study."

The more striking features of the structure of spiders were described, and especially the structure of the spinning organs and the glands that secrete the different kinds of silk, of which seven kinds have been recognized.

The various uses of silk were indicated; its use in the making of webs for capturing prey, for enveloping prey, for making egg-sacs, for making retreats, as a drag-line, and for travelling through the air.

The methods of procuring food were described: by stalking their prey, by lying in ambush, by the use of irregular webs, by the use of sheet webs, by sheet webs and irregular webs combined, by webs containing a hackled band, and by orb-webs. Photographic illustrations of all these different types of webs were shown.

A detailed account of the making of an orb-web and of the different types of orb-webs was given and illustrated by lantern slides.

Photomicrographs of the different kinds of silk were shown. Especial attention was called to the hackled band of Filistata, in which there are four kinds of silk, and to the structure of the viscid line in an ordinary orb-web.

Under the head of "The Motherhood of Spiders" an account was given of the different ways that spiders care for their eggs, and the care of their young by the members of certain families.

At the close of the address a view of a "gossamer sea" was shown. This was from a photograph of a plowed field, which was so completely covered with the silk of aeronautic spiders that it had the appearance of a lake, the furrows resembling waves.

A hearty vote of thanks, proposed by Prof. Lochhead, and seconded by Prof. Dearness, was extended to Prof. Comstock for his instructive and entertaining address.

After the lecture an informal gathering took place, at which refreshments were served by Mrs. B. A. Bensley, Mrs. E. M. Walker and Miss Snazelle, and a pleasant chat was enjoyed by the members and visitors.

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## SECOND DAY'S SESSION, FRIDAY, NOV. 6TH, 1914.

On Friday morning, at 9.30 o'clock, the President took the chair in the lecture room of the Royal Canadian Institute, and opened the meeting by calling upon the Secretary-Treasurer to read the Report of the Council.

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## REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for the year 1913-14.

The Fiftieth Annual Meeting of the Entomological Society was held at the Ontario Agricultural College, Guelph, on Wednesday, Thursday and Friday, August 27th, 28th, and 29th, 1913. The meeting of the Council and business meeting were held in the Biological Lecture-room, and the open sessions in Massey Hall. The chair was occupied by the Vice-President, Dr. C. Gordon Hewitt, Dr. Bethune being unable to act in a presidential capacity as a result of impaired eyesight.

The meetings were well attended, not only by members of the Society, visitors from the town and students and staff of the Ontario Agricultural College, but also by a considerable number of distinguished entomologists from the United States and Great Britain, present as delegates from various societies, institutions and government services.

The members and delegates were entertained during the meetings by the College authorities, being provided with accommodation in Macdonald Hall. The Council wishes to take this opportunity of expressing its appreciation of the hospitality shown by the College authorities during the course of the meeting.

The annual meeting of the Council was held on Wednesday morning. It was decided on discussion that the proposed changes in the constitution be referred to the Society, along with certain other business items. Recommendation was made to the Society that the next Annual Meeting be held in Toronto.

On Wednesday afternoon the members and delegates were formally welcomed by President Creelman of the College. Congratulatory addresses were then delivered by the various delegates and the meeting closed with a highly interesting paper by Dr. Felt, State Entomologist, of New York, on "Adaptations in Gall Midges."

On Wednesday evening Dr. and Mrs. Creelman received the delegates and members at their home, where a very enjoyable evening was spent.

Thursday morning, at 9.30, a business meeting of the Society was held. The chief business enacted was the adoption of the revised constitution of the Society. Election of one life and several corresponding members then took place. The election of officers followed, and the meeting closed with the extension of a hearty vote of thanks to Dr. and Mrs. Creelman for the numerous and varied kindnesses shown the delegates and members of the Society during the course of the meeting.

At 10.30 on Thursday, a general meeting was held. Letters and communications of a congratulatory nature were read. Dr. Bethune then delivered the presidential address on "Reminiscences of the Early Days of the Society." The remaining time of the morning and afternoon meetings was occupied with the reading of the following papers:

"Green Lanes and Byways," Rev. Dr. Fyles, Ottawa.

"On the Immature Stages of the Tenthridinidæ," Dr. A. D. MacGillivray, University of Illinois, Urbana, Ill.

"Galls," Dr. A. Cosens, Toronto.

"Chrysomelidæ of Ontario," Mr. F. J. A. Morris, Peterborough.

"Applied Entomology for the Farmer," Prof. F. M. Webster, Bureau of Entomology, Washington, D.C.

On Thursday evening a very interesting lecture, illustrated with a large number of beautiful lantern slides, on "Ants" was delivered by Dr. W. M. Wheeler, of Harvard University.

Friday, the last day of the meeting, was occupied with an excursion to Grimsby and the Niagara fruit district, and lunch was partaken of at the Village Inn, Grimsby.

The *"Canadian Entomologist,"* the monthly journal of the Society, has been issued regularly each month. The 45th volume was completed in December last. It consisted of 438 pages, and was very extensively illustrated. The circulation of the journal is now approximately 700, so the circulation has not been lowered by the increased subscription price.

In the Annual Report of the Society, besides the proceedings of the Jubilee Meeting, the reports of the various officers and branches of the Society were published, and also the following papers:

"Insects of the Season in Ontario," L. Caesar, O.A.C., Guelph.

"The Entomological Record," Arthur Gibson, Division of Entomology, Ottawa.

Regular meetings of the Society were held in the Biological Lecture-room of the Ontario Agricultural College on alternate Thursday afternoons during the winter months. In addition to the enaction of considerable business, the following papers were read and discussed:

"Entomological Notes in Egypt," by Prof. T. D. Jarvis.

"The Apple Maggot," by Mr. C. A. Good.

"Insect Pests of the Season," by Mr. L. Caesar.

"The Mole Cricket," by Dr. Bethune.

"Collecting Insects," by Mr. A. W. Baker.

"The Cherry Fruit-fly," by Mr. G. J. Spencer.

A meeting was also held in conjunction with the Wellington Field Naturalists' Club, at which Dr. W. A. Riley, of Cornell University, delivered an address on "Insects as Carriers of Disease."

The reports of the various branches showed that the year 1912-13 was a very successful one withal. The Council takes much pleasure in announcing that during 1913-14 seventy new members have joined the Society.

It is with the deepest regret that the Council records the death of two distinguished members of the Society. Mr. Henry H. Lyman, President, 1897-1899, was lost in the wreck of the steamship "Empress of Ireland" on the 29th of May last. Dr. William Saunders, C.M.G., died at his residence in London, Ontario, on the 13th of September; he was one of the original founders of the Society, for many years Editor of the *"Canadian Entomologist,"* and filled various offices, including the Presidency of the Society. Full obituary notices and portraits of both of these eminent Entomologists have already been published in the July and October issues of our magazine.

It was moved by Mr. Lochhead, and seconded by Mr. Gibson, that the Report of the Council be adopted. (Carried.)

The President: In putting this motion to the Society, I am sure that you will appreciate the fact that our Society is in a very strong and prosperous position. The increase in membership recorded is very gratifying to all members of the Society, who have felt sometimes that possibly the Society was not making the headway they would like. We certainly have no grounds for that fear at the present time. The report of the Council in regard to the *Canadian Entomologist* is most encouraging and gratifying, showing that our journal is in a very live state. I think we all appreciate the results which are following the efforts of Dr. Walker and those assisting him to make the journal a worthy Canadian journal. It is larger this year than ever before; the standard of the papers is higher, and above all, the character of the illustrations and the method of reproduction are such as have never appeared in our previous issues. Therefore, we have every reason to be proud of our journal at the present time.

## REPORT OF THE MONTREAL BRANCH.

The Montreal Branch of the Entomological Society of Ontario, begs to report as follows on the work of the members for the year 1913-1914.

The 344th regular and 41st annual meeting was held on Saturday, May 9th, 1914.

The Council reported an average attendance of over six per meeting, and regretted to report the death last summer of one of our members, Mr. E. Denny. Two new members had been added to our roll and two had resigned.

The papers presented at the meetings were as follows:

1. Annual Address of President ..... G. A. Southee.
2. On the Egg of Macronoctua onusta Grote ..... A. F. Winn.
3. Captures of Lepidoptera at light for the season of 1913..... G. H. Clayson.
4. Hemiptera taken at Bondville, Que., July, 1913 ..... Geo. A. Moore.
5. Lygus pratensis Linn. A Hemipterous Insect as seen by a Lepidopterist ..... A. F. Winn.
6. Hellotropism in Butterflies, or Turning Towards the Sun.... A. F. Winn.
7. Notes on Lepidoptera Collected by Dr. E. M. Walker on a Trip to British Columbia ..... A. F. Winn.
8. Naucoridae ..... Geo. A. Moore.
9. The Breeding of Papaipema stenocelis Dyar, in one fifty mile radius of New York, by H. Bird; read by ..... H. H. Lyman.
10. Notes on the Season in England ..... L. Gibb.
11. Heredity ..... A. F. Winn.
12. Mendelism ..... Geo. A. Moore.
13. The Atlanta Meeting of the Ent. Soc. of America and the Assoc. of Economic Entomologists ..... H. H. Lyman.
14. Emesidae—Thread-legged Bugs..... Geo. A. Moore.
15. Aradidae—Flat Bugs..... Geo. A. Moore.

On January 15th, 1914, we had a microscopic exhibition at which three instruments were used and many interesting slides were shown and studied.

The Treasurer showed a balance brought forward to next year of $90.41.

The following officers were elected for the coming year:

*President* ..... A. F. Winn.
*Vice-President* ..... G. Chagnon.
*Secretary* ..... Geo. A. Moore.
*Treasurer and Curator* ..... H. H. Lyman.
*Librarian* ..... G. Chagnon.
*Council* ..... G. A. Southee, G. H. Clayson, E. C. Barwick.

Geo. A. Moore,
*Secretary.*

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## REPORT OF THE TORONTO BRANCH.

The eighteenth annual meeting of the Toronto Branch was held on Tuesday, June 9th, 1914, in the Biological Building, the President, Dr. Cosens, occupying the chair.

The minutes of the previous meeting having been read and confirmed, the report of the Council, financial report, and report of the librarian were presented and adopted.

Nine meetings, including the annual meeting, have been held during the season 1913-14. Following the precedent established last year, one special open meeting was held during the season, the attendance of visitors at which was

very good, although the number present was unfortunately reduced by the fact that the meeting was held on the same evening as the opening of the Royal Ontario Museum by H.R.H. the Duke of Connaught. At this meeting the address was given by Mr. C. W. Nash.

One meeting was also held in conjunction with the Biological Section of the Royal Canadian Institute, at which the speaker was Dr. C. G. Hewitt, Dominion Entomologist.

The average attendance at the other meetings was eight members, and in several cases visitors were present.

The interest in the papers has been broadened and perhaps increased by the fact that in one or two cases they were not strictly confined to entomology, but extended a little into other sections of biology.

The titles of the papers and addresses given during the season are as follows:

Oct. 16. Dr. A. Cosens. "Some Captures of the Season."
Dr. E. M. Walker, "A New Species of Orthoptera, Forming a New Genus and Family.
Nov. 13. Mr. E. Horne Craigie, "Summer Work in Scotland."
Dec. 11. Mr. K. F. Auden, "Arthropoda of the Bahamas."
Dr. E. M. Walker, "Primitive Insects."
Mr. Arthur Gibson (Ottawa), "The Growth and Work of the Division of Entomology."
Jan. 29. Dr. C. D. Howe (University of Toronto), "Insects in Relation to Plants."
Mar. 19. Mr. C. W. Nash, "The Place of Insects in Nature."
April 16. Dr. C. G. Hewitt, "The Control of Insect Pests in Canada."
April 23. Mr. J. B. Williams, "Some Butterflies from Java."
May 14. Dr. E. M. Walker, "Syrphidae."
June 9. Mr. S. Logier, "Ants."

A field meeting was held on May 30th, at Fisherman's Island.

Five new members have been elected by the branch during the season. The Society has suffered the loss of an old and valued member in the person of the late Dr. A. R. Abbott, and one member has resigned. The Society wishes to express its regret at the tragic death of Mr. H. H. Lyman, who, though not a member of the Toronto Branch, had upon several occasions favoured it with a paper, and was well known to many of its members.

The financial report showed a small deficit, the expenses of the Branch during the season having been considerable.

The Librarian's report showed that twenty-seven publications besides the monthly numbers of *The Entomological News* had been received during the past year.

The election of officers resulted in the re-election of all the officers and members of the Council, the vacancy made in the Council by the resignation from membership of Mr. Jackson being filled by Mr. C. A. Snazelle.

Thus the officers for the ensuing year are:

President, Dr. A. Cosens; Vice-President, Dr. E. M. Walker; Secretary-Treasurer, E. Horne Craigie; Librarian, S. Logier; Council, J. B. Williams, C. W. Nash, Arthur Smith, C. A. Snazelle.

Eight members were present at this meeting.

Respectfully submitted,

E. Horne Craigie.
*Secretary.*

## BRITISH COLUMBIA BRANCH REPORT.

### The Entomological Society of British Columbia.

*January, 1914—January, 1915.*

### Publications and Meetings.

The Entomological Society of British Columbia has recently issued and distributed Bulletin No. 4 of their series (October, 1914) recounting the Proceedings of the Society at their annual meeting of January 23rd and 24th, 1914. Fifteen hundred issues of the Bulletin have been printed and a copy has been sent to every member of the Ontario Entomological Society and its various branches in the Dominion of Canada, whose name occurs in the recent "list of members."

In addition, copies have been mailed to entomologists on the mailing list in England, United States and Australia, and further, every member of the British Columbia Fruit Growers' Association will receive a copy through the medium of the Provincial Department of Agriculture.

Several hundred copies of Bulletin No. 4 still remain, and these will be sent to anyone on application to the Secretary so long as the supply lasts. The executive of the British Columbia Branch, however, reserves the right to retain as many copies of all their publications as they deem fit, now or later, for local distribution in the years to come.

All members present at the annual meeting of the Ontario Society, (November, 1914) will have received, no doubt, their copies of Bulletin No. 4 (and Bulletins 1, 2, 3) of the British Columbia Branch. It will be needless, therefore, to recount the titles of the papers presented at the various times.

The second midsummer semi-annual meeting of the British Columbia Entomological Society was held in Kelowna, in the Okanagan Valley, on August 20th, 1914, at which the following programme was presented:

"Entomological Problems Requiring Solution in Our Orchards" ..... Lionel E. Taylor, F.Z.S., M.B.O.U.
"The Practical Farm Manufacture of Combined Insecticides" ..... H. H. Creese, Asst. Fruit Pest Inspector.
"The Practical Value of Natural Methods of Insect Control Under Orchard Conditions". R. C. Treherne, Field Officer, Dom. Div. En.
"The Comparative Prevalence of Insect Pests in Various Parts of the Okanagan Valley". Max Ruhman, Asst. Prov. Ent. and Pathologist.
"Conditions Relative to the Codling Moth"... Thomas Cunningham, Prov. Insp. Fruit Pests.
"The Control of Incipient Infestation of Codling Moth" ..... W. H. Lyne, Asst. Prov. Insp. Fruit Pests.
"Aphid Notes from British Columbia" ..... Prof. H. F. Wilson, Corvallis, Oregon.
"The Occurrence of the Malarial Mosquito in the Okanagan" ..... Seymour Hadwen, D.V.Sci., Dom. Dept. Agr.
"Sprays of Up to Date Interest" ..... L. L. Palmer.
"Insect Pollination of Plants" ..... Tom Wilson, Dom. Insp. Ind. Orchards.
"Insects in Relation to Spread of Plant Diseases" ..... J. W. Eastham, Prov. Plant Pathologist.
"The Tarnished Plant Bug, Lygus pratensis". R. C. Treherne, Dom. Div. Entomology.
"Myzaphis (Aphis) abietina" ..... Prof. H. F. Wilson, Corvallis, Oregon.
"General Fire Blight Discussion and Records of Insects of the Year" .....

It is hoped that the proceedings of this second midsummer meeting will appear in print as Bulletin No. 5 of the British Columbia Branch in due course, and be distributed as with the former issues.

## Previous Publications.

Bulletin No. 3 recording the Proceedings of the first midsummer semi-annual meeting which took place in Vernon, in the Okanagan Valley on July 18th, 19th, 1913, was duly printed and issued to members in the fall of 1913. About 200 issues of this publication still remain in the library of the British Columbia Branch, and copies will be sent to all who require them, the Society reserving the right as before mentioned.

Bulletin No. 2, recording the Proceedings of the annual meeting of the Society which took place in Victoria, on Vancouver Island, on January 9th, 1913, has been duly printed and distributed. The issue of this bulletin is now practically exhausted.

Bulletin No. 1, recording the Proceedings of the Society at its reorganization meeting which took place in Vancouver, on December 9th, 1911, is now also nearly exhausted. Sufficient copies were printed at the time to distribute among the members of the Canadian Entomological Societies.

Bulletins Nos. 3 and 4, were printed for the Society by the "King's Printer" in Victoria, through the courtesy and authorization of the Provincial Department of Agriculture and the Department of Education. Copies of these two bulletins may be obtained free at any time by anyone, the before-mentioned reservation being enforced.

Bulletins Nos. 1 and 2 were printed at the private expense of the Society, consequently, as so few copies still remain, those requiring issues will have to make arrangements in consideration with the executive of the Society.

Five years previous to December 9th, 1911, the Society had experienced a condition of "suspended animation" and no publications were issued. Previous to that again, and following the inception proceedings of the Society in 1901, a series of pamphlets, 10 in number, were issued, but none of these now remain for distribution. It is hoped that at some time the present executive of the Society will re-issue these old records for the benefit of the present members.

## Finances.

Up to and including the annual meeting of the British Columbia Branch in January, 1914, the Society has issued their publications and carried on their business from their own funds obtained by annual subscriptions and by private loans, with the exception of Bulletin No. 3, which was printed through the authorization of the Hon. Price Ellison, Minister of Agriculture for the Province. As a result the Society carried a deficit on its hands for two years amounting to about $100. During the session of the Provincial Legislature in the winter of 1914, and through the courtesy again of the Hon. the Minister of Agriculture, a grant of $350 was placed to the credit of the Entomological Society of British Columbia. In addition the printing of Bulletin No. 4 was authorized through the Government press. The grant was made available in April, 1914. The result is that at the present moment (November, 1914) past debts have been removed and the Society can be credited with having issued four bulletins of 263 pages in all, and retains a balance to its credit in the bank of over $200. With this

surplus it is proposed to arrange various illustrations of insects and insect life for the future publications, which sadly need something of the sort.

### Future Prospects.

It will be a matter of interest to the members to hear that the "Entomological Society of British Columbia" went on record at its annual meeting in January, 1914, in favour of retaining their intimate connection with their parent Society, the Ontario Entomological Society.

A code of By-laws was drawn up and passed and Article 1 dealing with the "Title" states that "This Society shall be known as the 'Entomological Society of British Columbia' being the British Columbia Branch affiliated with the Entomological Society of Ontario (hereinafter called 'the parent Society')."

It will be recalled that at the inception proceedings of the Society in 1901, this Society in the West formed as a separate Entomological Society in the Dominion. A few years later it united with the Ontario Society, which at the time was the "Canadian Entomological Society," in order that the members might receive the issues of the *Canadian Entomologist*. The members of this Branch now fully realize the national character of the Society and the value and importance of co-ordinating the entomological work in the Dominion, consequently Article 2 of the By-laws states that: "This Society shall remain an integral unit in the Entomological work in the Dominion of Canada, shall remain embodied in aims and endeavours with other branches of the parent Society, and shall continue in connection with and under the constitution of the parent Society."

The remainder of the articles in the By-laws will be found on page 10, in Bulletin No. 4 of the British Columbia series, so need not be detailed here.

It has been decided that the annual meetings of the British Columbia Society shall take place in January of each year. This was considered the most suitable time of year for all concerned in British Columbia. The report of these annual meetings must, therefore, be tendered the Ontario Society, which usually holds its annual meetings in the autumn of the year, ten months after date.

It is the endeavour on the part of the Executive of the Branch to hold a popular economic midsummer meeting at some important agricultural centre in the Province every year. The object of these meetings is to bring entomological information to the farmer or fruit grower in his own locality. No business is transacted at these meetings and only advice is tendered on pests of the year and control measures. Two such meetings have already been held, one in 1913, at Vernon, and one this year at Kelowna. The attendance varied in the two meetings between 45 and 60, which sufficiently bespeaks the successful nature of such meetings.

At present the Branch exhibits plenty of "life," and the prospects are excellent for the future.

### Membership.

The membership of the Society has increased during the past three years. The list of members has been published in each annual report of the Proceedings and the numbers are as follows:

Bulletin No. 1, January, 1912 ..... 24 members.
Bulletin No. 2, January, 1913 ..... 72 members.
Bulletin No. 4, January, 1914 ..... 97 members.

A few members have dropped out during this year (1914) several having left the Province to reside elsewhere. On the other hand, the executive has several more names on their records for membership at their forthcoming annual meeting in January, 1915.

Many of the members of the Branch are not active collectors or recorders, but they find a knowledge of an entomological nature useful to their business, consequently, with their application for membership before the executive, they are included as members to receive such publications as are issued.

Respectfully submitted,

R. C. Treherne,
*Secretary B. C. Branch Entomological Society, Agassiz, B.C.*

## REPORT OF THE CURATOR.

The collections of the Society have been regularly examined and kept free from museum pests. Only a few additions of Diptera have been made during the last year. The Society is urgently in need of named specimens of Hymenoptera, Diptera and Hemiptera, and contributions from members would be greatly appreciated.

Respectfully submitted,

G. Spencer, *Curator.*

## REPORT OF THE LIBRARIAN.

During the year ending October 31st, 1914, eighteen bound volumes have been added to the library, making the total number on the register 2,207. A large number of periodicals, bulletins and pamphlets are received in exchange for the *Canadian Entomologist* and as gifts from authors and publishers; these continue to remain unbound owing to the absence of local facilities for doing the work properly. During the last three months very few publications have come from the continent of Europe owing to the war, and we have discontinued mailing our magazine to the countries involved.

The library continues to be used to a large extent by the staff and students of the Biological Department of the Ontario Agricultural College, to whom it is of great value, and also to a limited extent by members of the Society at a distance.

Respectfully submitted,

Charles J. S. Bethune, *Librarian.*

## REPORT OF DELEGATE TO THE ROYAL SOCIETY OF CANADA.

The President: I think the brief reference which I made yesterday in my Presidential address to the late Mr. Lyman's attendance at the Royal Society meeting can be taken as a report of the delegate to the Royal Society, if that is your wish.

## ELECTION OF OFFICERS.

The meeting then proceeded with the election of officers. (See page 6.)

THE PRESIDENT: The meeting is now open to receive nominations for membership in the society.

PROF. LOCHHEAD: Besides the names of those who have already been sent in, I would beg to nominate our friend Father Leopold, of the Trappe, as a member. He has taken a great deal of interest in horticultural work—that is his speciality—but he is also a missionary or instructor of entomology amongst the French-Canadian students at Quebec. He is doing excellent work and will be one of the most valued members of our society, and the fact that he has taken the trouble to come up here on this occasion shows that he has an interest in the work. I have much pleasure in presenting Father Leopold as a member.

MR. GIBSON: I take much pleasure in seconding that motion. We have known for many years of the splendid work which Father Leopold has accomplished for the Province of Quebec, and I am sure that his identity with our society now will be a great help to all of us.

I would also like to take this opportunity of nominating Mr. J. C. Chapais as a member of the society.

THE PRESIDENT: I think the society will feel it a privilege to elect these two members. As I pointed out in my Presidential Address, they have each done most valuable work of a pioneer character in entomology in Quebec, and will certainly be an additional source of strength to the society, and, therefore, in putting their names to the meeting for election I should like you to show your appreciation of their work by a unanimous election.

THE SECRETARY then read letters from various distinguished entomologists in the United States who had been invited to the Society's meeting, but had been unable to be present.

THE PRESIDENT: Prof. Lochhead is down on the programme for a paper on "The Injurious Insects of Quebec in 1914," but I understand that he has also prepared an account of the work of Fabre, the celebrated French entomologist, whose work has come so much to the front during the last year or two. I, therefore, suggest that Prof. Lochhead give us a very brief note of the insects of Quebec, and then read to us his paper on Fabre.

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## BRIEF NOTES ON SOME OF THE INJURIOUS INSECTS OF QUEBEC, 1914.

W. LOCHHEAD, MACDONALD COLLEGE, QUE.

Climatic and other conditions have apparently been somewhat unfavourable to the development of injurious insects in Quebec. Dry weather prevailed during April, May and June. Over Western Quebec there occurred a period of twenty-six days—in May and June—when no rain fell. The summer of 1913 was also a dry one, and under such conditions for two successive seasons some insect forms tended to multiply. The Army-worm and the Red-Backed Cutworm (*Euroa ochrogaster*) appeared in large numbers in some localities, the former doing damage in Pontiac County, and the latter in many sections, more especially to corn and roots.

Tent-caterpillars, which were very destructive last year, were again in evidence, but not nearly in such large numbers. Moreover, the mortality was very high, due to a bacterial disease and to dipterous and hymenopterous parasites. It is very probable, therefore, that tent-caterpillars will not be troublesome again for some years.

### Farm Crops.

Aside from the Army-worm and the Red-backed Cutworm referred to, farm crops did not suffer much from insect attack. Last year, for the first time, the Clover-seed Chalcid (*Bruchophagus funebris*) was observed. This year it was again present, and a large percentage of the developing seed in the field was destroyed. A large number of larvæ and pupæ were obtained from samples of seed sown in the spring.

This insect usually winters over in the seed as a well-developed larva; the pupal stage is rather short, and the adult, which is a minute black four-winged fly about 1-12th inch long, lays her eggs in May and June. The first of the adults of this brood appear in July and August, but some do not come out until the following spring.

The Turnip Flea-beetle (*Phyllotreta vittata*) was common on crucifers in spring, and did considerable injury to seedling turnips.

Later in the season *Systena hudsonica* was found feeding on clover and potatoes, as well as on a number of wild plants.

The Pea-aphis (*Macrosiphum pisi*) was present in large numbers on peas in various parts of the province and did considerable injury.

Grasshoppers and Locusts were abundant in pasture lands, but not in sufficient numbers to cause alarm to the farmers.

Clover-root Borer (*Hylastinus obscurus*) was also abundant.

### Orchard and Garden.

The Bud-worm (*Tmetocera ocellana*) is one of the most serious pests in apple orchards in Quebec. At the college the larvæ were found on apples, pear, plum and cherry. Mr. Du Porte found four different hymenopterous parasites in the pupæ. Perhaps, however, the most important parasite is *Pentarthron minutum*, which destroyed over seventy-five per cent. of the eggs.

The young apples in many orchards were injured by a species of Green Fruit-worm (*Xylina*), and many apples in August and September showed peculiar spotting of the flesh resembling Bitter Pit, which could not be accounted for satisfactorily. It is probable that some of this injury is caused by the punctures of capsids, but these were never observed at work.

Neither the Codling Worm (*Carpocapsa pomonella*) nor the Railroad Worm or Apple Maggot (*Rhagoletis pomonella*) was so abundant this year as last. In fact very few complaints reached us regarding injury from either insect. The latter insect is very common on lands in the vicinity of Macdonald College.

In some pear and cherry orchards the Pear Slug (*Eriocampoides limacina*) completely defoliated the trees in June and July, and again to some extent in September. Prompt treatment with arsenate of lead, white hellebore, freshly slaked lime, or black leaf 40, 1 pint in 100 gals. water, would have prevented injury.

The Plum Aphis (probably *Myzus mahaleb*) was abundant in the early sea-

son, but, as was to be expected, it became scarce later. It has the habit of migrating to other plants and feeding on them for the rest of the season.

Apple Aphids (mostly *Aphis pomi*), were also abundant, but it was observed that they were partially held in check by lady-birds and by Syrphidæ and lace-wing larvæ.

The Tarnished Plant-bug (*Lygus pratensis*) continues to be troublesome on a great variety of vegetable crops and flower gardens. It is the "Dahlia Bug" of the florist and the "Strawberry-button Bug" of the gardener.

Potatoes were attacked severely by the Potato Flea-beetle (*Epitrix cucumeris*) and the Colorado Potato Beetle. The Perillus was not observed feeding on the latter to any extent.

Currants and gooseberries were attacked very much as usual by the Currant Saw-fly and Currant Span-worm (*Cymatophora ribearis*), but both were readily controlled by arsenicals.

Various species of Root-maggots were present, and did much injury to onion (*Phorbia cepetorum*), to cabbage, cauliflower and radish (*Phorbia brassicæ*), to turnips and corn (*Phorbia fusciceps*), but not to the same extent as last year.

The Beet-leaf Miner (*Pegomyia vicina*) attacked the spinach in the college plantation last year. Some varieties of mangels were badly injured.

In this Province there is much need for more information regarding the Capsidae and the Jassidae, for the impression is deepening that the bugs belonging to these two families are of much importance economically. More detailed field studies are also required of Wireworms, Cutworms and White Grubs, for very little seems to be known about their distribution.

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## JEAN HENRI FABRE, THE FRENCH ENTOMOLOGIST.

W. Lochhead, Macdonald College, Que.

During the past summer I came across two volumes of entomological essays by J. Henri Fabre, and read them with very great interest. His name was already known to me through his writings on Spiders and Bees, but I had no adequate conception of the wide field of insect life which Fabre has thoroughly studied during his long life. Later I picked up three other volumns of essays, likewise selections from the "Souvenirs Entomologiques," and these I found as entertaining and instructive as the first two. Ashamed of my ignorance of this master observer, I looked about for information as to his life, and I was fortunate in securing Legros' work, entitled, "Fabre, Poet of Science," published by the Century Company, which gave much of the information I desired. (See Plate, page 7.)

Jean Henri Fabre was born December 22nd, 1823, in St. Léons, in the Department of Vaucluse, near the mouths of the Rhone. His father was poor and thriftless, and moved about from place to place as a café-keeper. Young Fabre's school days, often most uninteresting, were passed at St. Léons, at Rodez, at Toulouse, and at Montpellier. At seventeen he obtained by competition a bursary into the Normal School at Avignon, where he remained two years and got his superior certificate, which permitted him to teach. His first experience along this line was gained as a primary teacher in the College of Carpentras. While there, however, he found time not only to gratify his passion to know the world of nature

about him, but also to study for specialist certificates in mathematics and physical science.

From Carpentras he went to the College in Ajaccio, in Corsica, as Professor of Physics and Chemistry, where he had an opportunity of studying nature under new and wilder conditions. He explored and collected assiduously whenever his regular duties, which were heavy, permitted. It was at Ajaccio that he came in contact with Requien and Moquin-Tandon, two celebrated naturalists, and his bent for natural history was strengthened.

From Ajaccio he went to the College at Avignon, where he remained twenty years, as Assistant-Professor of Physics. His salary was small, and his teaching duties were heavy. Notwithstanding all the difficulties he had to contend against he studied and investigated. He secured by examination his Doctorate in Sciences from Paris, and continued his researches among insects. His fine abilities as a teacher attracted the attention of Duruy, Minister of Public Instruction, who visited him and later summoned him to Paris, where he was made Chevalier of the Legion of Honour. He refused, however, to accept any offer held out to him, under the belief that independence of thought and action would be interfered with.

In 1871 Fabre left Avignon on account of the hostility of the faculty and went to live at Orange. There he wrote his celebrated scientific primers for schools, which influenced a whole generation of French youth, and which brought in some much-needed revenue. There, too, he met John Stuart Mill, who helped him out of some financial difficulties. He continued his studies of insect life, and in 1878 appeared the first volume of his "Souvenirs Entomologiques," which have made him famous throughout the entomological and literary world.

From Orange, Fabre moved to a secluded spot at Serignan—"The Hermitage" —where he lives with his family, continues his observations, and meets the many friends who come to do him homage.

At last Fabre is recognized as one of the greatest naturalists of the time. The ten volumes of "Souvenirs Entomologiques" are a monument to his genius. The tardy recognition given him by his own countrymen is due, partly at least, to his dislike for public notoriety, his aversion to the acceptance of any position which would interfere with his independence of action, and to his extreme poverty, which prevented him from leaving the little world in which he loved to labour. (See note, p. 68.)

The main purpose of this paper is to draw attention to Fabre's wonderfully delightful series of descriptive observations, studies and experiments on the habits of many common insects, a series but little known, I believe, to Canadian students of insect life. We have been so busy classifying, dissecting, and working out life-histories that we have overlooked that other interesting field of work in which Fabre has done such magnificent and lasting service.

But there is another reason why I bring Fabre to your attention. His descriptions are masterpieces. Maeterlinck, himself a student of insect life and a master of literary expression, calls Fabre the "Insects' Homer, whose brow should be girt with a double and radiant crown."

It is a pleasure to turn from the prosaic pages of most of our entomological writers to the charming descriptions of this great French writer. His pages remind us of those of Gilbert White of Selborne, and of Thoreau, whose pure literary style still charms us, and at the same time causes many of us to feel that, as a rule, we do not give sufficient attention to the literary form in which our observa-

tions are clothed. However valuable our observations may be, it is almost certain that posterity will hardly remember them as literature.

Fabre is more than a great observer and literary artist; he is also a scientific philosopher, probing into the mysteries of life and trying to find satisfactory explanations for the things he sees. He possesses, moreover, the creative imagination of a poet. He sees everywhere about him great problems of life to be solved, and his success is largely due to his marvellous knowledge of the sciences allied to his own. Everywhere throughout his essays he applies physics, chemistry, and mathematics in the discussion of his problems. The results he obtains are thoroughly original from his standpoint, since he disdains to make use of the work of other investigators. His library is scanty and he reads but little. He makes no effort to get into touch with the great minds of the day, preferring to get his information from nature herself.

It is interesting to note how Fabre looks upon evolution. His independent mind does not take kindly to theories, and his studies remind him forcibly that there are too many exceptions in nature to be pinned to any great sweeping hypothesis. He has, however, a warm affection for Darwin, with whom he corresponded because he saw in him a man searching after truth, but he could not bring himself to adopt Darwin's views of changes by slow variations. With Fabre "species are born as a whole, each at the same time and at the same moment." He sees, however, in creation continuity of progress. We wonder how he views mutations.

Legros gives us an insight into the manner of work of this remarkable man. His mornings are devoted to experiments and to writing the results of his observations; his afternoons to excursions and observations. He is unable while sitting to get his ideas into shape for writing. "Moving like a circus-horse about the great table of his laboratory, he would begin to tramp indefatigably round and round, so that his steps have worn in the tiles of the floor an ineffaceable record of the concentric track in which they moved for thirty years. His mind would grow clear and active as he walked, smoking his pipe and using his "marrow-bones," He was already at work; he was "hammering" his future chapters in his brain. He would wait until the word quivered and palpitated and lived." Then only would he sit at his little walnut table and begin to write, "his pen dipped not in ink only, but in heart's blood," first in ordinary note books, then, after compilation, "on loose sheets of paper, making one draft after another, patiently fashioning his style and polishing his work."

Another feature of Fabre's writings must not be overlooked. His language is uncommonly free from scientific technicalities and terminologies. He prefers the popular words and phrases which every person can understand. He has little use for the scientific jargon which often obscures and seldom makes clear.

After a careful reading of the volumes before me one is struck with the marvellous patience, the scientific minuteness and precision, the ingenuity, and the faculty of expressing his observations with wonderful clearness and order, shown by the author. He reveals a new world, a world so full of mystery and of tragedy that one is dazed with the new problems which are open for solution. To these difficulties Fabre says in his humility of mind: "Success is for the loud-talkers, the self-convinced dogmatists: everything is admitted on condition that it be noisily proclaimed. Let us throw off this sham and recognize that, in reality, we know nothing about anything, if things were probed to the bottom. Scientifically, nature is a riddle without a definite solution to satisfy man's curiosity. Hypothesis fol-

lows on hypothesis; the theoretical rubbish-heap accumulates; and truth ever eludes us. To know how not to know might well be the last word of wisdom."

The limited time at my disposal makes it impossible for me to show adequately how Fabre treats his themes. I venture, however, even at the risk of sacrificing the beauty, delicacy and precision of his descriptions, to make a few excerpts relating to the habits of a few forms he discusses.

First, regarding the Praying Mantis. Fabre describes minutely how it captures its prey, the mating process, and the making of its nest. I shall quote a few paragraphs of his description of its cannibalistic courtship. After mating, "the two finally separate, but they are soon to be made one flesh in a much more intimate fashion. If the poor lover is loved by his mistress as the giver of fertility, she also loves him as the choicest of game. During the day, or at latest on the morrow, he is seized by his companion, who first gnaws through the back of his neck, according to use and wont, and then methodically devours him, mouthful by mouthful leaving only the wings. Here we have no case of jealousy, but simply a depraved taste. I had the curiosity to wonder how a second male would be received by a newly fecundated female. The result of my inquiry was scandalous. The Mantis in only too many cases is never sated with embraces and conjugal feasts. After a rest, of variable duration, whether the eggs have been laid or not, a second male is welcomed and devoured like the first. A third succeeds him, does his duty, and affords yet another meal. A fourth suffers a like fate. In the course of two weeks I have seen the same Mantis treat seven husbands in this fashion. She admitted all to her embraces, and all paid for the nuptial ecstasy with their lives."

Here is his description of a massacre of Pine-caterpillars by Golden Gardeners (*Carabus auratus*): "In a spacious, glazed insectorium I have twenty-five Carabi aurati. At present they are motionless, lying beneath a piece of board which I gave them for shelter. Their bellies cooled by the sand, their backs warmed by the board, which is visited by the sun, they slumber and digest their food. By good luck I chance upon a procession of pine-caterpillars, in process of descending from their tree in search of a spot suitable for burial, the prelude to the phase of the subterranean chrysalis. Here is an excellent flock for the slaughter-house of the Carabi. I capture them and place them in the insectorium. The procession is quickly reformed; the caterpillars, to the number of perhaps a hundred and fifty, move forward in an undulating line. They pass near the piece of board, one following the other like the pigs at Chicago. The moment is propitious. I cry Havoc! and let loose the dogs of war; that is to say, I remove the plank. The sleepers immediately awake, scenting the abundant prey. One of them runs forward; three, four, follow; the whole assembly is aroused; those who are buried emerge; the whole band of cut-throats falls upon the passing flock. It is a sight never to be forgotten. The mandibles of the beetles are at work in all directions; the procession is attacked in the van, in the rear, in the centre; the victims are wounded on the back or the belly at random. The furry skins are gaping with wounds; their contents escape in knots of entrails, bright green with their aliment, the needles of the pine trees; the caterpillars writhe, struggling with loop-like movements, gripping the sand with their feet, dribbling and gnashing their mandibles. Those as yet unwounded are digging desperately in the attempt to take refuge underground. Not one succeeds. They are scarcely half-buried before some beetle runs to them and destroys them by an eviscerating wound."

Again, Fabre makes these observations regarding egg-laying in the case of the

Pea-weevil: "We should expect to find signs of a procreative economy which would impel the female to take into account the number of peas contained in the pod which she has just explored; we might expect her to set a numerical limit on her eggs in conformity with that of the peas available. But no such limit is observed. The rule of one pea to one grub is always contradicted by the multiplicity of consumers. My observations are unanimous on this point. The number of eggs deposited on one pod always exceeds the number of peas available, and often to a scandalous degree. However meagre the contents of the pod there is a superabundance of consumers. Dividing the sum of the eggs upon such or such a pod by that of the peas contained therein, I find there are five to eight claimants for each pea; I have found ten, and there is no reason why this prodigality should not go still further! What is to become of all these supernumeraries, perforce excluded from the banquet for want of space?"

Some of Fabre's most interesting observations and descriptions in the second volume before me relate to the habits of Dung Beetles, the Sacred Beetle, the Spanish Copris, Geotrupes, and others.

This is how he describes the making of the ball of manure by the Sacred Beetle, which is to serve as food later on: "Armful by armful, the material is heaped up under the belly, between the four legs, which, by a slight pressure, impart their own curve to it and give it a first fashion. Then, between whiles, the rough-hewn pill is set spinning betwixt the four branches of the two spherical compasses; it turns under the Dung Beetle's belly until it is rolled into a perfect ball. Should the surface layer lack plasticity and threaten to peel off, should some too-stringy part refuse to yield to the action of the wheel, the fore-legs correct the faulty places; their broad beeters pat the ball to give consistency to the new layer and to imbed the recalcitrant scrap into the mass.

"Under a hot sun, when the work is urgent, one stands amazed at the turner's feverish activity. And thus the business proceeds apace: what was but lately a scanty pellet is now a ball the size of a walnut; soon it will be a ball the size of an apple. I have seen greedy-guts manufacture a ball the size of one's fist. Here, of a certainty, is food in the larder for days to come!"

The ball is then rolled to its burrow, often with great difficulty, either alone or with the help of a comrade. "Let us call the two fellow-workers partners, although that is not the proper name for them, seeing that the one fastens himself upon the other, who probably accepts outside help only for fear of a worse evil. The meeting, however, is absolutely peaceful. The beetle owning the ball does not cease work for an instant at the arrival of his assistant, and the newcomer seems animated by the best intentions and sets to work on the spot. The way in which the two partners harness themselves differs. The owner occupies the chief position, the place of honour; he pushes behind the load, with his hind-legs in the air and his head down. The assistant is in the front, in the reserve position, head up, toothed arms on the ball, long hind-legs on the ground. Between the two, the ball rolls along, pushed before him by the first, dragged towards him by the second."

No one has described so well as Fabre the life and love of the dangerous Languedocian Scorpion. With his usual patient and ingenious experiments he lays bare for us the domestic life of these curious creatures. He reveals their home life, their canibalistic mating, and the production of young. Here are a few extracts relating to their mating habits:—

"There are sometimes poses of the highest originality. Front to front and

claws drawn back, two wrestlers assume the acrobat's 'straight bend,' that is to say, resting only on the fore-quarters, they raise the whole back of the body, so much so that the chest displays the four little lung-sacs uncovered. Then the tails, held vertically erect in a straight line, exchange mutual rubs, glide one over the other, while their extremities are hooked together and repeatedly fastened and unfastened. Suddenly, the friendly pyramid falls to pieces and each runs off hurriedly, without ceremony."

Again: "Two scorpions face each other, with claws outstretched and fingers clasped. It is a question of a friendly grasp of the hand and not the prelude of a battle, for the two partners behave to each other in a most peaceful way. There is one of either sex. One is paunchy and browner than the other: that is the female; the other is comparatively slim and pale: that is the male. With their tails prettily curled, the couple stroll with measured steps along the pane. The male is ahead and walks backwards, without jolt or jerk, without any resistance to overcome. The female follows obediently, clasped by her finger-tips and face to face with her leader. . . . Often they tack about. It is always the male who decides which fresh direction the pair shall take. Without releasing her hands, he turns gracefully to the left or right about and places himself side by side with his companion. Then, for a moment, with his tail laid flat, he strokes her spine. The other stands motionless, impassive."

And again: "The idyll of the evening is followed, during the night, by a hideous tragedy. Next morning, we find the scorpioness under the potsherd of the previous day. The little male is by her side, but slain and more or less devoured. He lacks the head, a claw, a pair of legs. I place the corpse in the open, on the threshold of the home. All day long the recluse does not touch it. When night returns she goes out, and, meeting the defunct on her passage, carries him off to a distance to give him a decent burial, that is to finish eating him."

Fabre has furnished characteristic descriptions of several species of flies, published in "The Life of the Fly." The following extracts are taken from his chapter on the Grey Flesh Flies:—

"Two flies of the genus Sarcophaga frequent my slaughter-yard: *Sarcophaga carnaria* and *Sarcophaga hæmorrhoidalis*, whose abdomen ends in a red speck. The first species, which is a little larger than the second, is more numerous, and does the best part of the work in the open-air shambles of the pans. It is this fly, also, who, at intervals and nearly always alone, hastens to the bait exposed on the window-sill. She comes up suddenly, timidly. Soon she calms herself and no longer thinks of fleeing when I draw near, for the dish suits her. She is surprisingly quick about her work. Twice over —— Buzz! Buzz!—the tip of her abdomen touches the meat; and the thing is done: a group of vermin wriggles out, releases itself and disperses so nimbly that I have no time to take my lens and count them accurately. As seen by the naked eye, there were a dozen of them. What has become of them? One would think they had gone into the flesh, at the very spot where they were laid, so quickly have they disappeared. But that dive into a substance of some consistency is impossible to these new-born weaklings. Where are they? I find them more or less everywhere in the creases of the meat: singly, and already groping with their mouths."

"Let us first consider the grub. It is a sturdy maggot, easy to distinguish from the Greenbottle's by its larger girth, and especially by the way in which its body terminates behind. There is here a sudden breaking-off, hollowed into a deep cup. At the bottom of this crater are two breathing-holes, two stigmata

with amber-red tips. The edge of the cavity is fringed with half a score of pointed, fleshy festoons, which diverge like the spikes of a coronet. The creature can close or open this diadem at will by bringing the denticulations together or by spreading them out wide. This protects the air-holes which might otherwise be choked up when the maggot disappears in the sea of broth. Asphyxia would supervene, if the two breathing-holes at the back became obstructed. During the immersion, the festooned coronet shuts like a flower, closing its petals and the liquid is not admitted to the cavity."

"Enclosed in her pupa, the nascent fly begins by bursting the lid of her casket with a hernia which comes beween her two eyes and doubles or trebles the size of her head. This cephalic blister throbs: it swells and subsides by turns, owing to the alternate flux and reflux of the blood. It is like the piston of an hydraulic press opening and forcing back the front part of the keg.

"The head makes its appearance. The hydrocephalous monster continues the play of her forehead, while herself remaining stationary. Inside the pupa a delicate work is being performed: the casting of the white nymphal tunic. All through this operation, the hernia is still projecting. The head is not the head of a fly, but a queer, enormous mitre, spreading at the base into two red skull-caps, which are the eyes. To split her cranium in the middle, shunt the two halves to the right and left, and send surging through the gap a tumour which staves the barrel with its pressure: this constitutes the fly's eccentric method.

"For what reason does the hernia, once the keg is staved, continue swollen and projecting? I take it to be a waste pocket into which the insect momentarily forces back its reserves of blood in order to diminish the bulk of the body to that extent and to extract it more easily from the nymphal slough and afterwards from the narrow channel of the shell. As long as the operation of the release lasts, it pushes outside all that it is able to inject of its accumulated humours; it makes itself small inside the pupa and swells into a bloated deformity without. Two hours and more are spent in this laborious stripping.

"At last the fly comes into view. The wings, mere scanty stumps, hardly reach the middle of the abdomen. On the outer edge they have a deep notch, similar to the waist of a violin. This diminishes by just so much the surface and the length, an excellent device for decreasing the friction along the earthy column which has next to be sealed. The hydrocephalous one resumes her performance more vigorously than ever; she inflates and deflates her frontal knob. The pounded sand rustles down the insect's sides. The legs play but a secondary part. Stretched behind, motionless, when the piston-stroke is delivered, they furnish a support. As the sand descends they pile it and nimbly push it back, after which they drag along lifelessly until the next avalanche. The head advances each time by a length equal to that of the sand displaced. Each stroke of the frontal swelling means a step forward. In a dry, loose soil, things go pretty fast. A column six inches high is traversed in less than a quarter of an hour.

"As soon as it reaches the surface the insect, covered with dust, proceeds to make its toilet. It thrusts out the blister of its forehead for the last time, and brushes it carefully with its front tarsi. It is important that the little pounding-engine should be carefully dusted before it is taken inside to form a forehead that will open no more: this lest any grit should lodge in the head. The wings are carefully brushed and polished: they lose their curved notches: they lengthen and spread. Then, motionless on the surface of the sand, the fly matures fully."

I could give many more passages from Fabre's delightful "Souvenirs Ento-

mologiques," all showing a master living close to Nature and with infinite patience unravelling insect secrets which have heretofore escaped less careful observers, but it is far better to read the full descriptions as he gives them. To me the perusal of these volumes revealed a great, if not the greatest, observer of the last two generations.

## Notes.

Darwin makes reference in the "Origin of Species" on three occasions to Fabre, who is termed "that inimitable observer": Chapter 4, page 108, Part I.; Chapter 8, page 336, Part I.; and Chapter 14, page 252, Part II.

A year or two ago, when it became known that Fabre was in meagre circumstances, if not in want, many noted scientific men and readers of his works were prepared to help him. He wrote: "I am poor, it is true, but I am also happy; a modest shelter, frugal food, perhaps a glass of the wine of the country or a pipe, and the delight of a Provençal garden where I can observe my beloved insects—what more could an old man who loves nature want. Thank you, but NO!"

### Selections from "Souvenirs Entomologiques," Available to English Readers.

| | Published by |
|---|---|
| "Social Life in the Insect World" | The Century Co. |
| "The Life and Love of the Insect" | A. & C. Black. |
| "The Wild Bee" | Dodd, Mead & Co. |
| "The Mason Bees" | Dodd, Mead & Co. |
| "The Life of the Fly" | McLelland & Goodchild, Toronto |
| "The Life of the Spider" | Dodd, Mead & Co. |
| "Insect Life" | Macmillan Co. |

### References to Fabre's Life and Work.

"Fabre, Poet of Science." By Dr. C. V. Legros. Translated by Bernard Miall ..... The Century Co., New York.

| | | | |
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| "Fortnightly Review" ..... | Vol. | 98, page | 663. |
| " " ..... | " | 100, " | 661. |
| "Outlook" ..... | " | 103, " | 371. |
| " ..... | " | 105, " | 45. |
| "Literary Digest" ..... | August 24th, 1912. | | |

The President: I am sure that the Society is very much indebted to Prof. Lochhead for bringing to its notice—and to many of them, though I am sorry to think it, for the first time—the name of Fabre. For many years, in fact since I took an interest in entomology, which goes back to my childhood, I have always been interested in Fabre's work, and have read in the original many of his more important papers which appeared in the "Souvenirs Entomologiques." I have no hesitation saying that Fabre is, without exception, the greatest entomological observer that ever lived or perhaps ever will live. It is wonderful not only to read his inimitable language, but to read between the lines and note the extraordinary patience involved in making those observations on insect life. He would lie out on his little patch of land, and would stay there under the hottest sun for five or six hours just to watch one insect and its habits, and return day after day, sheltering under an old sunshade. Prof. Lochhead did not mention an excellent book recently written on Fabre, namely, "Fabre, the Poet of Science." I would advise everyone to read this interesting volume, in which his life is outlined and extracts given from his various books; these give a wonderful

insight into the old man's life and work. That book was only published about two years ago, because, as Prof. Lochhead has pointed out to the world in general, Fabre is really a recent discovery, but to entomologists who are interested in the habits of insects, as distinguished from their systematic relations, Fabre has long been known through his essays in the series of "Souvenirs Entomologiques" which were published in France. To those who are able and have the time I would strongly recommend them to read his essays in the original because, naturally, in the translations—while the translations are exceedingly well done—a great deal of the beauty of his French is lost. Even the translations of his descriptions in English show how magnificent and charming they are, and as Prof. Lochhead has pointed out, afford to us an excellent example to follow in descriptive work. I think our descriptions are becoming more and more less interesting—that is in entomological work, as a rule. If we can do anything that will improve our descriptive powers in entomology, we shall be doing a great service to the science in making it more interesting to others and not a "dry-as-dust" science. As I have said, and Prof. Lochhead also in regard to the recent discovery of Fabre, there are reasons for his obscurity, one of which I think was his neglect to answer his correspondence. Of course one can sympathize with him a good deal if the correspondence had been large, but there is no excuse for a man absolutely ignoring his correspondence as Fabre did. He would store away his letters and no one knew what he was doing. He did not care for the outside world; he was simply interested in his work for its own sake. There is another feature also—I am dwelling on the features which one does not like in his life as well as the more pleasing features—and that was his impatience with scientific names. Of course that is a very easy attitude to assume. It is very easy for a popular writer, but one can hardly understand it in a man of Fabre's eminence. He was truly a real entomologist, and yet time and time again he picks up a name and pokes fun at it. But he has to give names, and he has to use the name that he has given. He rather seems to put up an image only to knock it down. I do not think entomologists in foreign countries are to blame for not knowing about him in view of his great neglect of his own country. Of course it may have been due to his reclusive character. He hated publicity. He had many opportunities of becoming famous with all that it implies in friends, the receiving of distinctions, and going to Paris, but he threw it all up and kept to his little cottage where he still lives, and the way it is recorded is very delightful reading.

His writings are contributions not only to literature but positive contributions to science, and if one is working on such subjects as metamorphism, parasitism, etc., they cannot afford to neglect Fabre's observations, as I have often found in reading through many of his essays. His observations on the life history of the Meloidæ were unique in character as regards the habit of metamorphism: and then there is the extraordinary life history of parasitic insects such as the Anthrax Flies and the Odynerus Bees. In fact he anticipated much of our present work, and there is much entomological work described at the present day as original which is not original at all but anticipated by Fabre, yet was not known because his essays on those particular points had not been read. I would therefore recommend as "light reading" if you will—when one has the opportunity—the work of Fabre who, as I have said before, was certainly the greatest entomological observer and will ever remain eminent in that character. Perhaps Father Leopold would like to say a few words on this subject?

Father Leopold: I can only confirm what the President has just said. Personally I have taken very great pleasure in reading Fabre's original works.

It was in 1911, in Paris, that I was first advised to get his books. I got the ten volumes; I even got twelve—ten volumes of the whole work complete, and two other volumes of the Souvenirs, just extracts. I remember that coming back on the boat I used to take out the books and read them on the deck just as a novel or anything like that. The descriptions are so fine; it is such rich literature. You have no idea unless you get into those books what a man he is as an observer. There are so many instances of his impatience as has been said just now, that one is really astounded to see the work that has been done by him.

Prof. Dearness: Our President remarked just now that Fabre was the greatest of the entomological observers. I think he said that he regarded Fabre as the outstanding example. The work of the blind observer, Francois Huber, who studied so profoundly the habits and life history of the honey bee has seemed to me the most marvellous. I agree that the style in which much of the scientific literature written is not of the finest quality, but our Society can congratulate itself on having a member who adorns the expressions of his observations with as much grace as does Fabre—I refer to our honoured member, Dr. Fyles. Who can take up one of the Entomological Reports and read a paper from his pen without feeling how very graceful and interesting are the expressions of his original observations.

Prof. Lochhead's reference to the depredations on the larvæ recalls an interesting experience of my own. I had 100 or more nearly full-grown silk-worm larvæ in a suit-box kept where there was no reason to fear incursions of ants. One morning on returning to remove the frass an hour or two after the larvæ had been fed, I found an army of large brown ants—species of Lasius, I suppose—tugging at the mutilated silk-worms and struggling to carry them away. So many of them were either killed outright or so badly injured that not one in ten of them survived the attack of the ants. A single ant probably discovered the box, and then retired to summon and lead the whole ant colony to the plunder.

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## INSECTS INJURIOUS IN SOUTHERN QUEBEC, 1914.

C. E. Petch, Entomological Branch, Ottawa.

This year various species of caterpillars were very injurious to the foliage and fruit. Among the leaf eaters the tent-caterpillars were very serious pests again this year over the entire Province of Quebec. Some hymenopterous parasites were observed attacking the pupæ. A considerable number of egg masses have been observed and unless they are parasitized, the outlook for 1915 is serious. The lime-tree caterpillar, leaf-roller, bud moth, spring and fall canker worms were all very injurious in Huntingdon County. Late in September, the Yellow-necked Apple-tree Caterpillar (*Datana ministra*) was found defoliating bass-wood trees at Howick, Que. The larvæ of the common Cabbage Butterfly (*Pontia rapæ*) were very plentiful wherever cabbages were grown. Outbreaks of the Army-worm (*Leucania unipuncta*) were reported from Pontiac and Portneuf Counties.

Numerous young apples were attacked by a green caterpillar, which ate large holes in them, generally to the core. The caterpillars were a little over an inch long, naked, and light greenish-yellow with a light stripe down the middle

of the back and a much finer white stripe on either side. The apples attacked were from a few days old to ¾ in. in diameter. The damage done even in sprayed orchards was very serious. This was the most serious fruit pest this year. There were several enquiries regarding this injury, which was new to the fruit-growers in this Province. Another very serious fruit-eating caterpillar, one which has received very little prominence as such, was the Bud-moth larva (*Tmetocera ocellana*). These small larvæ ate irregular furrows on the surface of the fruit when nearly full grown. They fed generally under a leaf attached to the apples by some silken threads or where two apples touched. The Codling Moth larvæ (*Carpocapsa pomonella*) were very rarely found in the fruit this year.

The Apple-maggot (*Rhagoletis pomonella*) was very prevalent this year in some orchards of Fameuse, Twenty-Ounce, Alexander, and Wealthy. The only important scale insect was the Oyster-shell Scale (*Lepidosaphes ulmi*) but some Terrapin Scale was found on Prunus Americana and it was probably this scale which was abundant on the butternut. Large numbers of the Oyster-shell scale were found on the fruit of the apple and the plum, causing it to be greatly misshapen in many cases. Special enquiry was made about the Grape Leaf-hopper (*Typhlocyba comes*) from North Georgetown, Howick and Covey Hill. The aphids generally were quite plentiful. The Pea-aphis (*Macrosiphum pisi*) was quite injurious near Huntingdon. The Woolly aphis was prevalent in wounds and under cankered areas. The winged form was captured in large numbers by tanglefoot bands. The green aphis was common in July on young orchard trees and nursery stock. The Buffalo Tree-hopper (*Ceresa bubalus*) and some other tree-hoppers seriously injured young apple trees at Howick. Capsid bugs caused considerable injury to the fruit of apples and pears.

Flea-beetles and the Colorado potato beetle were quite common on potatoes this year. A steel-blue beetle was found injurious to turnips in Compton County. The Flat-headed Apple-tree Borer (*Chrysobothris femorata*) was found doing considerable damage to apple trees near Abbotsford. Several species of small bark-beetles did considerable damage throughout the Province. The Apple Curculio (*Anthonomus quadrigibbus*) was the second worst fruit insect this year, but the Plum Curculio (*Conotrachelus nenuphar*) was of minor importance. The Buffalo Carpet Beetle (*Anthrenus scrophulariæ*) was reported very prevalent in many homes at Tullochgorum.

Grasshoppers were extremely injurious in the Three Rivers region. There may have been insects injurious locally, but those mentioned in this paper were the most important for the Province as a whole.

## THE 1914 OUTBREAK OF THE ARMY WORM IN CANADA.*

ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT OF AGRICULTURE, OTTAWA.

Farmers in many parts of Canada, particularly in the south-western portions of the Province of Ontario, will long remember the devastating hordes of the cutworm-like caterpillars of the ARMY-WORM, *Cirphus* (*Leucania*) *unipuncta*, which appeared in their fields in the latter half of July and the first part of August of the present year. The outbreak was very similar to that which occurred in Ontario in the year 1896, when 39 counties and 118 townships were infested. In the same Province, during the present year, 42 counties and districts reported Army-worms, 234 townships being infested. In many of these, however, the infestation was light, and at such points apparently little damage was done.

Fig. 9.—Army-worms in trench, Carp, Ont., July 21, 1914. This trench should have been deeper (Original).

Fortunately, too, the caterpillars appeared at a time when many fields of grain, such as oats and barley, were approaching maturity, owing largely to the dry season which forced the growth.

In Ontario, the following counties and districts were infested: Essex, Kent, Lambton, Elgin, Middlesex, Huron, Bruce, Perth, Norfolk, Oxford, Waterloo, Wellington, Grey, Dufferin, Simcoe, Peel, Halton, Wentworth, Brant, Haldimand, Welland, Lincoln, York, Ontario, Durham, Victoria, Northumberland, Peterborough, Muskoka, Parry Sound, Nipissing, Algoma, Manitoulin, Hastings, Prince Edward, Lennox, Renfrew, Lanark, Leeds, Grenville, Carleton and Temiskaming.

The Ontario outbreak of the Army-worm was investigated chiefly by Mr. H. F. Hudson, Field Officer of the Branch, who conducted a vigorous campaign in Brant and Oxford counties where much of the chief damage took place. Mr. Hudson worked jointly with Mr. A. W. Baker, of the Ontario Agricultural College, and the various Ontario District Agricultural Representatives, and for such co-operation the Entomological Branch of the Dominion Department of Agriculture is grateful.

*This is discussed in full in a bulletin on the Army-worm soon to be issued by the Entomological Branch of the Dominion Department of Agriculture.

In Quebec Province the following counties were infested: Pontiac, Wright, Richelieu, Quebec, Portneuf and Champlain.

In New Brunswick these counties were infested: Kings, Queens, Sunbury, York, St. John, and Albert.

In Nova Scotia: Yarmouth, Digby, Queens, Annapolis, Kings, Hants, Lunenburg, Halifax, Colchester, Cumberland, Pictou, Antigonish, Guysboro, Cape Breton and Inverness.

In the western provinces no injury which we could trace to the Army-worm occurred. In several instances reports of injury were received, but upon investigation the insect was found to be the Sugar Beet Webworm (*Loxostege sticticalis*).

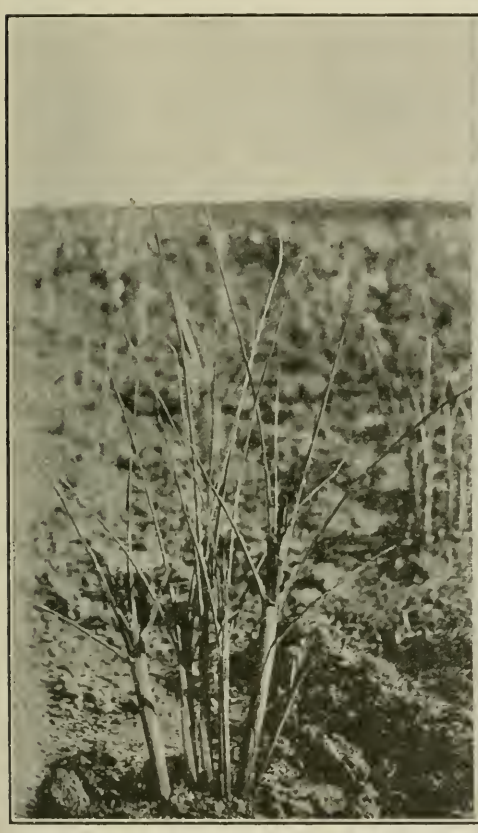

Fig. 10.—Individual corn plant, showing complete defoliation by army-worm, Kinburn, Ont., July, 1914 (Original).

Fig. 11.—Army-worms in trench, near Kinburn, Ont., July 1914 (Original).

In Manitoba the moths of the Army-worm were present in numbers in the earlier part of August, which would indicate that caterpillars were numerous in some localities. No injury, however, was reported.

The crops attacked were oats, barley, corn, hay, spring wheat, alfalfa, clover, peas, mangolds, beets, turnips and millet. The chief damage was done to oats and to pasture lands. In Ontario in the counties of Oxford, Brant and Elgin, where the Army-worms were most abundant, whole fields of oats, corn, and barley were devastated.

It is difficult to estimate the loss caused by the Army-worm during the past summer, but undoubtedly, all things being considered, such as destruction of crops,

loss of time caused in fighting the pest, with consequent neglect of other important work at such time, cost of extra labor, Paris green, etc., and threatened shortage of food, in some instances necessitating the sale of live stock, the total loss in the Province of Ontario alone will exceed at least a quarter of a million dollars. In Quebec, Nova Scotia and New Brunswick probably fifty thousand dollars would be a conservative estimate of the loss to crops.

At the request of the Entomological Branch, the Census and Statistics Office issued a special inquiry to its crop correspondents in Ontario regarding the occurrence of the Army-worm, and this has been of great assistance in the determination of the extent of the infestation and the approximate amount of damage effected. Farmers will be interested to know that no caterpillars of the overwintering brood of the Army-worm have been detected, even in the districts

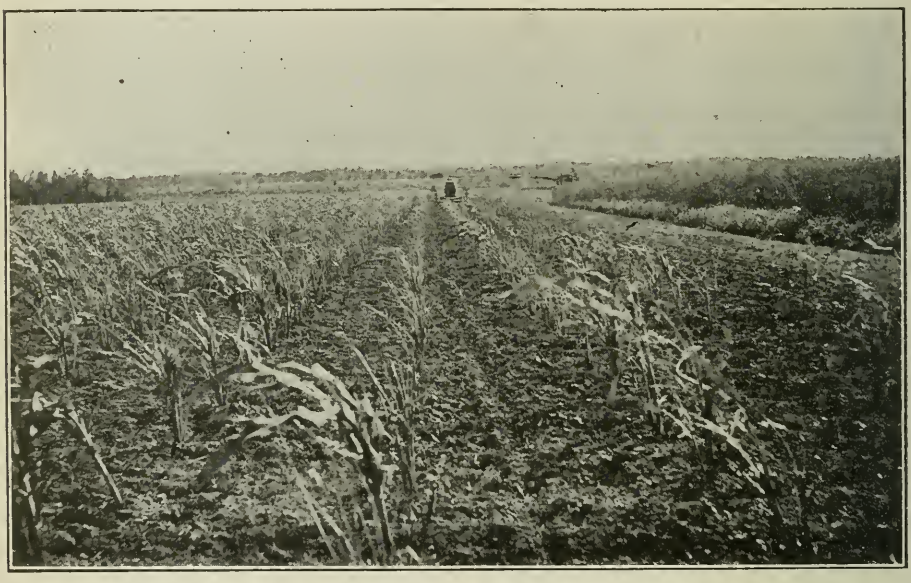

**Fig. 12.—Corn field devastated by army-worm, Kinburn, Ont., July 21, 1914 (Original).**

worst infested. Special searches have been made for these without success. The injurious brood of larvæ were heavily parasitized, particularly by the Tachinid fly, *Winthemia,* and in addition a bacterial disease destroyed great numbers. Predaceous beetles were also found feeding on them.

The above brief statement will indicate the serious nature of the Army-worm outbreak of 1914. The outbreak was, I think, the most serious of any of which we have definite knowledge. The chief infestation, as above stated, occurred in Ontario, but I shall not say anything further of that outbreak here, as Mr. Baker is discussing it in his paper which treats of his investigation in that Province. A full discussion of the subject will, however, be included in a bulletin which I am preparing, and which we hope to publish shortly.

The Army-worm when full grown is about an inch and a half long. It is a brown or blackish, smooth caterpillar, with three conspicuous yellowish or pale coloured stripes above, one down the middle and the others on either side of the back. These latter are bordered above with a narrow band of black. On each side are three conspicuous wide bands, the central one being blackish and the

upper and lower ones of a yellowish colour, more or less flushed with red. There are two annual broods in Canada, the moths appearing in June and again in August and September. Those which emerge in late summer lay eggs which hatch in about ten to twelve days. The young caterpillars winter in a partially grown condition beneath tufts of grass and other low herbage, and in the spring complete their growth feeding chiefly on grasses. In June moths from these caterpillars appear and lay eggs, producing another brood of caterpillars, and this brood, which is present in July and early August, is the one which in almost every instance has injured crops in Canada.

The chief method of fighting Army-worms is to plough furrows as deeply as possible, or dig trenches in advance of the caterpillars' line of march. These trenches should be at least ten inches deep, and along in them post holes at least one foot deep—two feet are better—should be dug every fifteen feet. The side of the trench nearest the crop to be protected should be straight, trimmed, if necessary, with a spade. In this year's outbreak, in clay land, it was found advisable, before the soil became dry, to rake lightly with a garden rake the vertical side. The soil as it dried became crumbly and fell off with the Army-worms which attempted to climb up. Such raking is important, otherwise the soil becomes baked like cement and the worms will crawl up it easily. When the Army-worms reach the furrow or trench they are blocked by the straight side and at once change their course, wandering along in the trench until they reach a post hole into which they fall. When thus trapped they are easily destroyed by pouring coal oil into the hole, or by crushing them by means of the blunt end of a post. Other methods of control will be given in our Departmental publication.

The President: Mr. Baker is to give us an account of the outbreak of the Army-worm in Ontario, and for that reason I am going to defer the discussion on both these papers until after Mr. Baker's paper. Mr. Gibson pointed out, and I should like to point out also, that so far as our work in Ontario was concerned, it was largely of a co-operative nature with the Provincial Department of Agriculture, and Mr. Baker was responsible for as much of the work that Mr. Gibson has described in his paper as our officer, Mr. Hudson at the Laboratory at Strathroy, Ont. The work was carried on in the entirely co-operative manner in which we wish to have all such work carried on.

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## THE ARMY WORM IN ONTARIO IN 1914.

By A. W. Baker, O.A.C., Guelph.

On Tuesday, July 14th, word was received from the Provincial Deputy Minister of Agriculture that an outbreak of Army Worms was taking place in Burford Township of Brant County. On July 15th, Army Worms were found in numbers at Guelph and reports of occurrences then came in rapidly from various parts of the Province. The writer left for Burford Village immediately on the arrival of the report from that district, and found the infestation very heavy. A visit, in company with Mr. J. E. Brethour, who rendered much assistance during the outbreak in Brant County, was at once made to Mr. W. H. Milmine, Reeve of Burford Township and Warden of Brant County. A meeting of the township council was called for Wednesday afternoon. This meeting was

addressed by the writer, and the Reeve then issued a proclamation calling on the farmers of the township to aid in the fight and authorizing expenditure on the part of the township where necessary. On Wednesday, Mr. H. F. Hudson of the Dominion Entomological Branch arrived at Burford, and the remainder of the week was spent with him in a farm to farm visit of infested districts in Brant and Oxford Counties outlining control measures to the farmers and assist-

Fig. 13.—The army-worm, Heliophila (Leucania) unipuncta, Haworth.

*a*. Adult; *b*. Pupae; *c*. Larva, showing eggs of Red-tailed Tachina-fly.

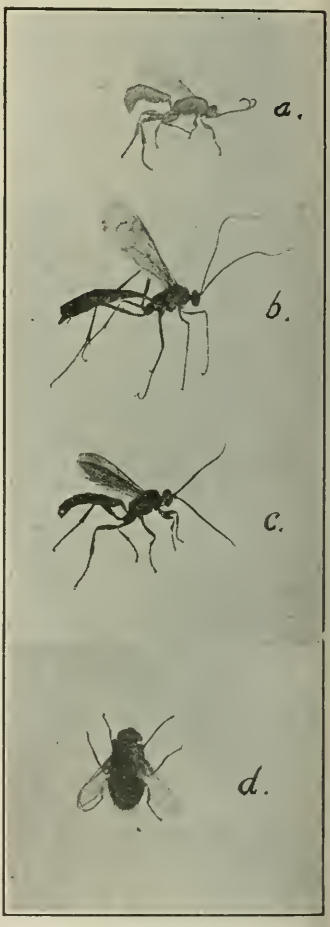


Fig. 14.—Parasites of the army-worm.
*a*. Ichneumon canadensis, Cress
*b*. Paniscus geminatus, Say
*c*. Ichneumon sp.; *d*. Winthemia 4-pustulata, Fabr.

ing them in the fight where necessary. Visits were then made to infested districts in various other counties by the writer and other members of the staff of the College. A press bulletin was also issued by the Department of Entomology, Ontario Agricultural College, describing the pest and outlining control measures.

The infestation in Brant County was very heavy, due to the large areas of admirable breeding grounds provided by the bottom lands of the various large

creeks running through the county. The loss in Brant was accordingly severe but the outbreak was brought under control, and the damage confined largely to restricted areas by the thorough and willing work of the farmers. In many cases men not threatened with attack came considerable distances to aid those attacked, and in instances gangs of eighteen or twenty men with half a dozen teams were busy trenching around infested areas. Where the men of a district co-operated in this way the damage was usually restricted to small areas.

### Distribution Within the Province.

The Army Worm occurred practically throughout the whole Province. The following is a list of the infested counties or districts and townships. The extent of occurrence and injury has been summed up from reports by the District Representatives of the Department of Agriculture, from various private reports sent in to the Department of Entomology of the Ontario Agricultural College, and from personal observation. The writer is indebted to Mr. Arthur Gibson of the Dominion Entomological Branch for records of occurrence in townships not otherwise reported.

*Essex County.* General in distribution throughout the county, but serious damage only in three or four districts. Greatest injury to oats, but because of heavy crop county yield probably about normal. Reported from the following townships: Anderdon, Colchester North, Colchester South, Gosfield North, Mersea, Malden, Pelee, Rochester, Sandwich South.

*Kent County.* General in distribution, but serious damage confined to small areas. Reported from following townships: Camden, Chatham, Dover, Harwich, Howard, Romney, Tilbury East, Zone.

*Lambton County.* Extensive in distribution. Greatest injury to oats. Over half crop destroyed on forty or fifty acres, less than half on 1,000-2,000 acres. Also light infestation in various small areas. Reported from following townships: Brooke, Dawn, Enniskillen, Moore, Plympton, Sarnia.

*Elgin County.* General in distribution. Greatest injury to oats. Serious loss only in a few small districts. Reported from following townships: Aldborough, Bayham, Dorchester South, Dunwich, Malahide, Southwold, Yarmouth.

*Middlesex County.* General in distribution. Most extensive outbreak in Nissouri township and here greatest damage to pasture. Outbreaks on individual farms in other townships with chief damage to oats. Reported from following townships: Biddulph, Caradoc, Delaware, Dorchester, Ekfrid, London, Mosa, Nissouri West, Westminster.

*Huron County.* General in distribution. Serious damage restricted to small areas. Reported from following townships: Ashfield, Colborne, Grey, Hay, McKillop, Morris, Tuckersmith, Usborne, Wawanosh.

*Bruce County.* General in distribution. Damage not serious. Only two fields completely destroyed. Reported from following townships: Amabel, Albermarle, Arran, Brant, Carrick, Culross, Eastnor, Elderslie, Greenock, Huron, Saugeen.

*Perth County.* Extensive occurrence only on one farm: chief damage to pasture. Reported from following townships: Blanshard, Downie, Ellice.

*Norfolk County.* General in distribution and extensive damage especially in northern part of county. Reported from following townships: Charlotteville, Middleton, Townsend, Walsingham, Windham, Woodhouse.

Fig. 15.—Trenching ahead of the army-worm.

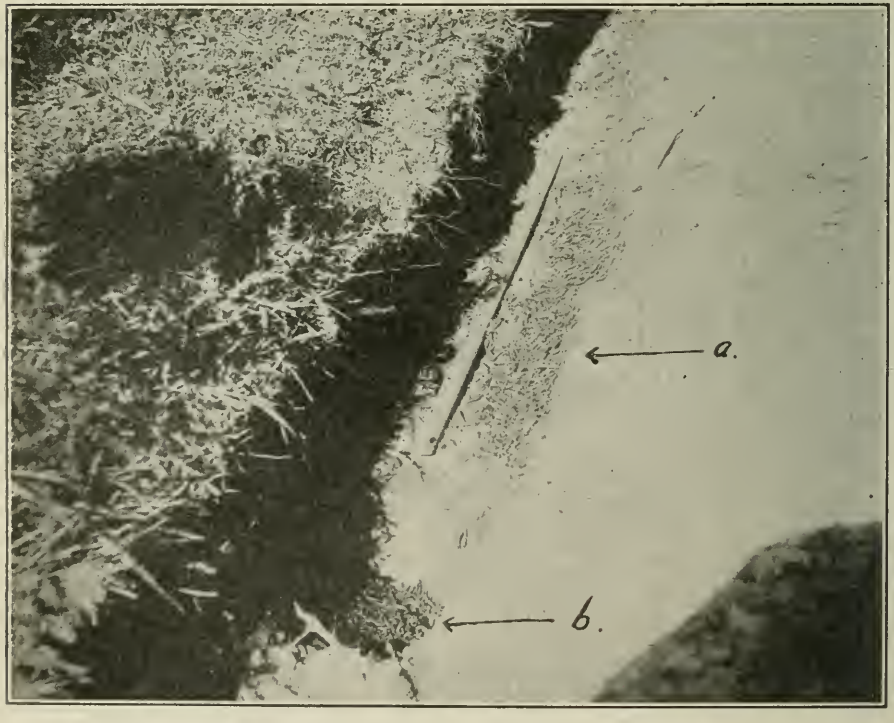


Fig. 16.—View of a trench showing army-worms in bottom (*a*), and collected in post hole (*b*).

Fig. 17.—A poorly-constructed trench. Note the loose, uneven wall up which the worms are readily passing.

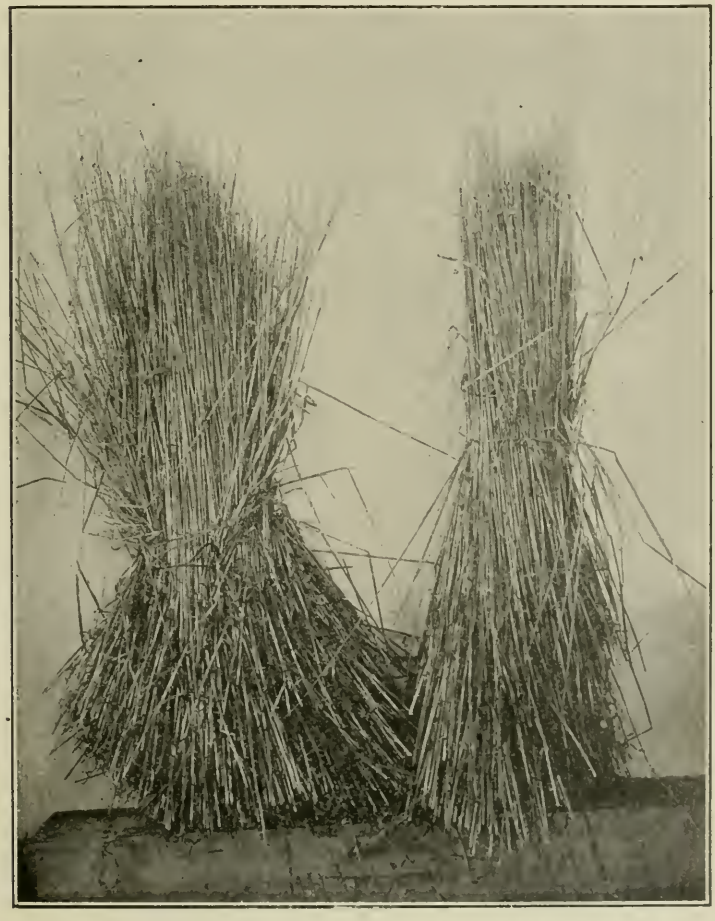

Fig. 18.—Oat sheaves, showing injury by army-worms to heads before grain was cut.

*Oxford County.* General in distribution. Extensive injury in four large areas and numerous small ones. Great damage, especially to pasture. Reported from following townships: Blandford, Blenheim, Dereham, Nissouri East, Norwich North, Oxford East, Oxford North, Oxford West, Zorra East, Zorra West.

*Waterloo County.* Serious damage only in few areas. 2,000 acres largest area. Reported from following townships: North Dumfries, Waterloo, Wilmot, Woolwich.

*Wellington County.* General in distribution. Injury only in small areas. Greatest damage to oats. Reported from following townships; Eramosa, Guelph, Nichol, Puslinch, West Garafraxa, West Luther.

*Grey County.* General in distribution, but damage comparatively slight. Reported from following townships: Derby, Egremont, Glenelg, Keppel, Proton, Sullivan, Sydenham.

*Dufferin County.* Limited in distribution. Areas of infestation small. Reported from following townships: Amaranth, East Garafraxa, Melancthon.

*Simcoe County.* General in distribution. Greatest injury to late oats and corn. Damage to other crops not over 10 per cent. in infested areas. Reported from following townships: Flos, Innisfil, Orillia, Sunnidale, Tecumseh, Tiny, Vespra.

*Peel County.* Most serious in Toronto Gore township. Greatest damage to oats. Reported from following townships: Chinguacousy, Toronto, Toronto Gore.

*Halton County.* General in distribution, but chief damage in a few limited areas. Reported from following townships: Nelson and Trafalgar.

*Wentworth County.* General in distribution. Damage not extensive. Most serious in pastures. Reported from following townships: Ancaster, Barton, Beverly, Binbrooke, Flamboro East, Flamboro West, Glanford, Saltfleet.

*Brant County.* General in distribution. Infestation over large areas. Greatest loss to pastures, but also extensive damage to timothy, oats and corn. Reported from following townships: Brantford, Burford, Dumfries South, Oakland, Onondaga, Tuscarora.

*Haldimand County.* General in distribution. Infested areas small. Greatest injury to green oats. Reported from following townships: Cayuga North, Dunn, Moulton, Oneida, Rainham, Seneca, Walpole.

*Welland County.* General in southern half of county. Serious only in a few small areas. Reported from following townships: Bertie, Humberstone, Stamford, Thorold, Wainfleet.

*Lincoln County.* Limited in distribution. Damage not extensive. Reported from following townships: Grantham and Niagara.

*York County.* General in distribution. Damage extensive over considerable areas. Reported from following townships: East Gwillimbury, King, Markham, Scarboro, Vaughan, Whitchurch.

*Ontario County.* General in distribution. Considerable damage to grain crops and loss in pasture extensive. Reported from following townships: Mara, Pickering, Reach, Thorah, Uxbridge, Whitby.

*Durham County.* Limited to a few small areas. Damage slight. Reported from following townships: Clarke, Darlington and Hope.

*Victoria County.* General in distribution. Present on most of farms of county but damage slight on most. Reported from following townships: Eldon, Emily, Fenelon, Laxton, Mariposa, Orps, Verulam.

*Northumberland County.* General in distribution. Damage not extensive.

Corn and oats attacked but chief injury to pasture. Reported from following townships: Brighton, Haldimand, Hamilton, Murray, Seymour.

*Peterboro County.* General in distribution. Damage not extensive over large areas. Reported from following townships: Dummer, Galway, Otonabee, Smith.

*Muskoka District.* Extensive in distribution. Damage considerable over large areas. Injury to timothy, oats and corn. Reported from following townships: Chaffey, Draper, Macaulay, Monck, Stisted.

*Parry Sound District.* Extensive in distribution. Damage over considerable areas. Reported from following townships: Armour, Hagerman, Himsworth, McMurrich, Ryerson.

*Nipissing District.* Chief occurrence in small isolated areas. Damage not extensive. Reported from following townships: Chisholm, Glackmeyer, Lamarche, Maisonville, Papineau, Springer.

*Temiskaming District.* Distribution general wherever much clearing. Damage not extensive. Reported from following townships: Armstrong, Dack, Dymond, Evanturel, Harley, Hilliard, Henwood, Hudson, Ingram, Kerns, Marter, Whitney.

*Algoma District.* Most extensive occurrence, over 500 acres in Bar River settlement. Also in neighbourhood of Sault Ste. Marie. Injury to timothy. Reported from following townships: Korah, Laird, Macdonald, Tarentorus.

*Manitoulin District.* Injury only in three localities. Chief damage on 100 acres in Carnarvon township. Reported from following townships: Assignack, Barrie Island, Carnarvon.

*Hastings County.* General in distribution. Chief injury to new seeding. Little done towards control. Reported from following townships: Madoc, Rawdon, Sidney, Thurlow, Tyendinaga.

*Prince Edward County.* General in distribution. Damage extensive, especially to pasture and corn. Reported from following townships; Ameliasburg, Athol, Hallowell, Hillier, Marysburg, Sophiasburg.

*Lennox County.* General in distribution. Damage extensive, especially to corn. Reported from following townships: Adolphustown, Ernesttown, Fredericksburg North, Fredericksburg South, Kaladar, Richmond.

*Renfrew County.* Chief occurrence in south-western part of county. Considerable damage in small areas. Greatest injury to barley. Reported from following townships: Admaston, Alice, Bromley, Horton, Ross, Westmeath.

*Leeds County.* No appreciable damage. Reported in small numbers in one locality of the township of Lansdowne.

*Grenville County.* No appreciable damage. Reported in small numbers in one locality of the township of Edwardsburg.

*Lanark County.* Occurrence only in two small areas. Chief damage to pasture. Reported from following townships: Pakenham and Sherbrooke South.

*Carleton County.* Occurrence only in northern part of county. Chief damage to oats. Reported from following townships: Fitzroy, Huntley, Torbolton.

The above records of distribution refer only to areas where Army Worms were present in sufficient numbers to do any real or appreciable damage. An examination of the appended map will show that the pest was general in distribution throughout Old Ontario with the exception of the counties in the eastern peninsula. The most northerly record was near Cochrane in Glackmeyer township of Nipissing district, and the most westerly in the neighbourhood of Sault Ste. Marie, Algoma District.

### Previous Outbreaks.

In the annual report of the Entomological Society of Ontario, for 1896, Professor J. Hoyes Panton gives details of an extensive outbreak of Army Worms during that season. He also mentions that the Army Worm was reported as present in Eldon Township, Victoria County in 1833, common in many places throughout the Province in 1861, and doing considerable damage in the counties of Lambton and Victoria in July, 1894.

The 1896 outbreak was extremely extensive. An examination of Prof. Panton's map will show the distribution. As would be expected he has no records of occurrence in New Ontario. A comparison of the 1896 and 1914 outbreaks in Old Ontario shows a striking similarity of distribution. A notable exception is Brant County. There is no record of occurrence in Brant County in 1896, whereas in 1914 it was the seat of the heaviest infestation. Since Brant County contains large areas of admirable breeding grounds, this apparent non-occurrence in 1896 is difficult of explanation.

In 1896 the Army Worm was reported from 39 counties and 118 townships; in 1914 from 42 counties or districts and 234 townships.

### Food Plants.

The following are the cultivated plants on which the larvæ fed during 1914, arranged in order of preference: pasture grasses, timothy, oats, corn, millet, barley, wheat and rye.

The greatest part of the feeding was on these grasses and cereals. Beets and mangels were largely free from attack; so also were potatoes, tomatoes and buckwheat. The various legumes were also practically exempt. In some cases the white clover in a pasture field was eaten to a limited extent, but not till after the grasses were entirely devoured. The writer examined numerous pea and bean fields in which the worms were present in large numbers, but in none did he see any signs of injury to the crop.

Numerous weeds and wild plants were devoured with varying degrees of avidity. No feeding on the foliage of trees was noticed, although the larvæ were observed at considerable heights on trunk and branches.

### Feeding Habits.

During bright weather the worms lay inactive to a great extent during the heat of the day, taking refuge beneath sods, loose sticks, stones, etc. At about four o'clock in the afternoon they became active, and where they were present in large numbers, moved off to new feeding grounds. Feeding appeared to take place largely during the late afternoon and evening—but during dull weather the worms fed all day in numbers.

The manner of feeding varied considerably with different plants. In pastures the worms devoured all the green grass, leaving only the dead grass from the previous year, so that the ground appeared bare and brown. In timothy fields the leaves and heads were eaten, only the bare stalks remaining, so that in badly infested fields the crop was practically a complete failure. Although the leaves of oat plants were eaten to a considerable extent, much of the feeding seemed to be in the head, in the course of which the grain was cut off, so that the yield was often greatly reduced even though the infestation might not be very heavy.

On mature corn the chief feeding was in the heart of the plant where the larvæ lay concealed. Where the corn was badly attacked when still young, it was stripped to the ground. In the few fields of millet which came to the notice of the writer the entire plants were devoured, so that no vestige of the crop remained in the field. In most fields of barley the worms confined their feeding to the awns, though there was some feeding on the leaves and some injury through gnawing off the grain. Wheat and rye were both so far advanced that there was little feeding upon them, though some loss was occasioned through the larvæ gnawing off the grain from the heads.

### Loss to the Province Through the 1914 Outbreak.

The loss occasioned through the feeding of the Army Worm is extremely difficult to determine. Mr. Arthur Gibson, of the Dominion Entomological Branch has estimated it at not less than a quarter of a million dollars in Ontario. In the opinion of the writer this estimate is not at all high. Estimates have been received from many of the District Representatives of the Ontario Department of Agriculture. These have all been based on injury to grain crops. A great part of the loss to the Province, however, was through the destruction of pastures and this is very difficult of estimation. Considerable loss also resulted indirectly from the loss of pastures. Men were forced to sell beef cattle at a sacrifice because of loss of pasture, and in some cases deterioration of the cattle themselves through lack of food resulted. Many dairy farmers experienced a decrease in the milk output as a result of loss of pasture, and some were even forced to sell milch cows. Considerable loss resulted from destruction of new seeding in many parts of the Province.

The loss to grain crops and timothy was, of course, very great, and if we were to add to this the direct and indirect losses through destruction of pasture and expense of time and materials used during the campaign against the pest, we would find Mr. Gibson's estimate of a quarter of a million dollars not at all excessive.

### Notes on Life History.

Mr. Gibson has discussed the life history of the Army Worm in his paper, so it is not the writer's intention to say anything on the detailed life history here. A few general points, however, may be of interest. One is the length of time from the first appearance of the first brood of larvæ till its last appearance July 15th to August 15th—at Guelph, showing that egg laying must have gone on over a considerable period of time. The first brood seems on the whole to have been later than in the outbreak in 1896. Egg laying in most cases was apparently on rank grasses in low grounds, but several instances were found where egg laying had clearly been on high ground. No egg masses were found in the fall in the field and only two small imperfect egg masses were obtained in the insectary from reared specimens. No individuals of the second or fall brood were found nor were any reared in the insectary. Several reports of the occurrence of a fall brood were received, but all proved unfounded. Cannibalism was exhibited by starved larvæ in captivity as has been recorded by various writers.

### Control Measures.

1. Trenches. Where the worms were moving from one area to another they were stopped by trenches placed across their line of march. Except under ideal

conditions a furrow run with a plow did not prove effective, it being found that the trench must at least be finished out by hand with a spade. After seeing trenches in various soils it was decided that a trench, to give satisfactory results, should be as follows: 15 inches to 18 inches in depth, with a clean straight side toward the direction in which the worms are going. This side may even be cut under if time will permit. The loose soil removed should be placed as a crown along this wall. In a heavy wet soil, as clay or muck, it will be found advisable to rake the surface of the straight side lightly with a garden rake before drying, otherwise the soil in baking will provide a hard continuous surface, up which the worms will readily travel. This raking should be repeated after a rain. The depth of the trench depends directly on the character of the soil and crop. In a clean sandy soil with a shallow rooted crop the trench need be only comparatively shallow. In a clay or gravel soil or one with a deep rooted crop the trench should be much deeper. At intervals of fifteen feet in the bottom of the trench post holes a foot in depth should be dug. When the worms are unable to pass up the wall of the trench they will travel lengthwise and collect in the post holes where they may be crushed with a post. During 1914, many persons attempted to kill the worms in the trenches by burning straw over them. The objection to this lies in the fact that the straws which are not burned may provide bridges out of or across the trench over which the Army Worms will pass in hundreds. Where only part of a field is attacked and the remainder is to be protected by trenching, it will be found advisable to cut a swath through the grain and rake this off before the trench is dug. This is necessary to insure a clean trench, and a clean trench is essential.

Where trenches were properly constructed excellent results were obtained, the worms being readily restricted to certain areas.

2. Poisoned Bran Mash. Where Army Worms were already present in a field and the trenches were of no value, poisoned bran mash scattered over the field gave excellent results. When tested even on areas of comparatively light infestation it gave high death counts, and in a number of districts injury to grain crops and corn was largely prevented through the timely use of the poisoned mash. The poisoned mash which gave the best results is prepared and used as follows:

Formula:

| | |
|---|---|
| Bran | 20 lbs. |
| Paris Green | 1 lb. |
| Lemons or oranges | 2 or 3 fruits. |
| Water | About 2 gals. |

Mix the bran and paris green in a tub, dry, add the molasses to the water, squeeze the juice of lemons or oranges into liquid, run the rind and pulp through a meat chopper and throw this into the liquid, then pour the liquid on the poisoned bran and mix thoroughly till all is like sawdust—not sloppy.

Scatter this in the evening by hand very thinly over the infested field as if sowing grass seed. The above amount should be sufficient for at least three acres.

3. Spraying with Paris Green or Arsenate of Lead. In the past the use of a poison spray has been rather widely recommended for the Army Worm. The plan has been to spray a belt of foliage in advance of the worms. The writer had the opportunity of witnessing the results of the use of such a spray at various strengths. In some cases as much as 4 lbs. of paris green, or 6 lbs. of arsenate of lead to 100 gals. of water was used in conjunction with 4 lbs.

of soap as a sticker. At no strength and under no conditions which came to the writer's notice did the spray give even fair results. It was looked on in most places as a decided failure. The difficulty appeared to lie in the fact that where the worms were coming in large numbers they would pass through even a very wide poison belt without stopping to feed.

4. Lime, Salt or Wood-ash Barriers. Reference has been made at various times to the use of barriers of lime, common salt, wood-ashes, etc., placed across the line of march of the worms. The writer saw barriers of these various materials used in individual cases and none of them proved of any value in checking the advance of the worms, unless the barrier was so high that it proved a mechanical obstacle.

5. Land Rollers. In several instances which came under the writer's notice land rollers were used with good effect where the worms were crossing a level piece of road. The rollers, of course, were kept going constantly so that the worms were crushed as they came out of one field and before they were able to reach the other. Good results were obtained with a roller, however, only when the ground was very level.

6. Brush Drags. A correspondent has informed the writer that during the 1896 outbreak heavy brush drags were used on pasture fields with good results. Unfortunately, this information arrived too late to test on the 1914 outbreak, but the writer sees no reason why a heavy brush drag would not give good results where the worms were present in a level pasture field or roadside.

## Suggestions for Control of Future Outbreaks.

From a summary of the above results one is led to conclude that any future outbreak of Army Worms can be handled successfully by:

1. The use of trenches where the worms are to be confined to a certain area.
2. The use of the poisoned bran mash where they are already scattered through a crop.
3. The use of land rollers and brush drags where conditions render practicable.

## Predaceous Enemies.

Various predaceous enemies did much to control the Army Worms in some localities.

1. Domestic Animals. Pigs, chickens, turkeys, ducks, geese and pigeons were all seen to feed to engorgement on the larvæ. In one or two instances the worms were certainly kept down over small areas by the feeding of pigs and poultry.

2. Insectivorous Birds. Various species of birds fed in considerable numbers on the larvæ.

3. Predaceous Insects. Various species of large ground beetles, such as *Calosoma calidum*, Fab., *C. scrutator*, Fab., and *Harpalus caliginosus*, Fab., as well as many smaller species were observed feeding on the larvæ in large numbers.

## Parasites.

The larvæ were heavily parasitized by insects during 1914, and this extensive occurrence of parasites had doubtless much to do with the rapid reduction in numbers of the first brood.

The material from which the parasites given below were reared was all collected at Guelph. Accordingly the distribution throughout the Province of most of the species is unknown to the writer. The "Red-tailed Tachina-fly," *Winthemia 4-pustulata,* Fab., and *Apanteles militaris,* Walsh, were general in distribution and numerous in all the counties visited.

The following are the species of parasites reared from the Army Worm at Guelph during 1914.

*Tachinidæ.*

1. *Phorocera* (*Euphorocera*) *claripennis,* Macq. Reared one specimen at Guelph.

2. *Wagneria* (*Phorichæta*) *sequax,* Will. Reared one specimen at Guelph.

3. *Winthemia 4-pustulata,* Fab. Reared in large numbers at Guelph, and generally distributed throughout the Province, farmers in all parts being familiar with the white eggs deposited on the thorax of the caterpillar immediately behind the head. The adults were first observed egg-laying on July 16th in Burford Township of Brant County, and on July 17th at Guelph. Early in the season only one or two eggs were laid on a single Army Worm, but as the season advanced and the Tachina-flies increased in number, the number of eggs per larva also increased. The largest number of eggs found on one larva was 38. It was noted that late in the season when the number of eggs per larva was large the percentage of eggs hatching was smaller than earlier in the season when the number of eggs per larva was smaller. *Winthemia* larvæ were observed to pupate within the body of the host as well as without, but those which came out to pupate emerged earlier than those which remained within the body of the host. Parasitized Army Worms which were killed by poisoned bran mash on July 22nd still contained living Tachinid larvæ on July 24th. One of these Army Worms was opened on this date and five Tachinid larvæ were found. Four of these were retained for examination, but one was placed back in the body of the dead Army Worm. This larva lived. It pupated on July 26th and the adult emerged on August 8th.

Individuals of this species were reared through as follows:

| | | |
|---|---|---|
| Eggs laid ..... | Aug. 8th | Incubation period 4 days. |
| Eggs hatched ..... | Aug. 12th | |
| Larvæ pupated ..... | Aug. 16th | Larval period 4 days. |
| Adults emerged ..... | Aug. 29th | Pupal period 13 days. |

In this case out of six eggs laid on the Army Worm four adults were obtained.

*Ichneumonidæ.*

1. *Ichneumon canadensis,* Cress. Reared in considerable numbers and observed commonly during 1914 outbreak in the fields at Guelph.

2. *Ichneumon jucundus,* Brulle. Reared in considerable numbers and observed commonly at Guelph.

3. *Ichneumon,* sp. This is a yellow banded form which has not yet been satisfactorily identified to species. It was the most common Ichneumon parasite at Guelph, being present in the infested fields in large numbers.

4. *Paniscus geminatus,* Say. Reared in numbers and numerous specimens captured on the wing.

5. *Mesochorus vitreus,* Walsh. Reared in numbers at Guelph. Walsh originally described this as a primary parasite of the Army Worm but Riley later stated that it was a parasite on Microgasters. In this case it was probably parasitic on Apanteles.

*Braconidæ.*

1. *Apanteles militaris,* Walsh. Present in large numbers at Guelph and apparently general throughout the Province. The cocoons of this species are placed in a loose white mass. These cocoon-masses were found in almost every infested area and were often mistaken by farmers for the eggs of the Army Worm. As many as 28 Braconid larvæ were dissected from one Army Worm.

2. *Apanteles,* sp. This species, which has not yet been identified, differs from *A. militaris* in that it has an elongate compact sulphury cocoon-mass. It was frequent at Guelph and in various other parts of the Province.

3. *Meteorus communis,* Cress. One specimen reared at Guelph.

*Chalcididæ.*

*Eupteromalus* sp. Reared in large numbers at Guelph from Army Worm larvæ and pupæ. As many as 74 Chalcid pupæ were dissected from one Army Worm pupa.

In addition to the above insect parasites the Army Worms were attacked by a bacterial disease.

The identification of Tachinidæ parasitic on the Army Worm were made for the writer by Mr. J. D. Tothill, of the Entomological Branch of the Dominion Department of Agriculture. The Hymenopterous parasites listed were determined by Mr. A. B. Gahan, of the Bureau of Entomology, U. S. Department of Agriculture.

The writer is indebted to Mr. J. P. Henderson, of Toronto, for numerous photographs of the outbreak in Brant County, some of which are reproduced.

The laboratory and insectary work in connection with the study of the Army Worm and parasites was carried on by Messrs. A. R. Burrows and R. S. Hartley, student-assistants of the Department of Entomology, Ontario Agricultural College.

Prof. Dearness: I saw the worms in Brant County in 1896.

Mr. Baker: Brant County has a number of large creeks running throughout the county, and large areas of flat lands stretching on each side of these which provide excellent breeding grounds. In many cases the roads would be black with them passing up from the flat areas to the crops. I can hardly credit the report of Prof. Panton that in 1896 when there was a severe outbreak, Brant and Oxford Counties should be free.

Prof. Caesar: For fear that it should be overlooked, I want to refer to a letter sent me by Prof. Dean of Kansas in connection with the army worm. I have had some correspondence with him on two or three things, and he made some reference to the army worm in that correspondence. He said he had found the new remedy for the grasshoppers so effective in preliminary tests that he recommended to the various counties in his section of Kansas that they set apart a day for army worm control and that they call it "army worm day" just as they had done in previous years for the grasshoppers. Their outbreak was in the spring of the year. As a result of this remedy—the sweetened poison bran—he said that one day's treatment resulted in complete control of the army worm all over the counties that used the remedy. I think that is very valuable. No doubt he will publish a paper on that subject, and we shall have fuller details sometime early in the spring.

The Secretary: Could you let us know how much they used there.

Prof. Caesar: I cannot give you the details of it. I intended to write to him for I was especially interested in the control of the army worm in corn fields. Those

of you who have observed the work of the army worm in such fields find that in the day time the worms are in the sheath concealed by the foliage, and the question arises, can a poison bran destroy the pest in the corn under those conditions. Personally I did very little work with the army worm. I made the test of the poisoned bran incidentally, and had to go away at once. The report when I came back was very favourable, we were not able to see it tested out in the grain fields. There were 270 killed to one yard in our test. That was where it was thrown over a field just like you would for the grasshoppers—five pounds to about 4 acres.

The President: We are very pleased to have with us Mr. Vernon King, who is a former student of the Agricultural College, and is now on his way to England to take part in the defense of the Empire, in which he will have our very sincere wishes for his safe return and success, and we should like to hear from him his experience in Missouri, where I believe they had some work carried on with the army worm under Mr. Webster of the United States Bureau of Entomology, Washington.

Mr. King: Thank you for your kind wishes for my welfare. As regards my work in Missouri, things are a little different. There are different conditions as regards entomological work than there are here. We have not the diversity of crops which you have here, and we do not meet with the difficulties in controlling the army worm down there. In two years—the last two years, 1913 and this spring—the army worms were very numerous in our locality, and always appeared in the wheat earlier, and were always preceded by large numbers of Bobolink and Red-winged Black birds, so that the farmers even now believe that they are responsible for the army worm. They do not distinguish between the two birds. They just give them a casual glance. The strange thing is that both times I have been there, the birds did precede the army worm, and when the latter were most numerous the birds went, so they asked me for an explanation. They would say that the birds had the germs in their wings and fluttered them out over the wheat. I tried to explain that that was not the case, and they wanted to know how I knew. I tried to explain that, too. I cannot account for the fact that they come when the food is plentiful unless the birds happen to be migrating at that time and going north, and possibly they may feed on the army worm.

As to the control of the army worm, I have had an opportunity of seeing large numbers of instances of ditching. As Mr. Baker said, it depends upon the soil and the way they do it. The best way I have seen is to plough a furrow and drag along by a chain a log about 8 inches in diameter; a darkey would sit on this with two sticks to balance himself. I have tried that, and it takes a little practise, especially in turning corners. That is the first process with a little log of small diameter which gets right to the bottom of the furrow. Next they use a little larger log of about 14 inches diameter. That of course gets some at the bottom and some at the side, and they finish off with a barrel, the darkey still sitting on it with his legs crossed and resting on the whipple-tree. That is in the morning about 8 o'clock. The worms come out about 2. The barrel makes the sides smooth. The worms continue for about ten days. I have seen some men in the hard land dig post holes, but that has no effect whatever for the holes soon fill up with clods. The best success was with the dragging.

The farmers claimed that the worms were beneficial in the wheat because they ate the leaves off.

In the post holes the Calosoma Beetles gathered in large numbers, and so while I was collecting some army worm parasites (there are lots there,

and snakes and toads and everything else) it occurred to me that the beetles might be useful. I wired Prof. Webster and he told me to send them to New Mexico. The chief harm done by the army worm was the time lost by the farmers. I managed to send hundreds and thousands of black beetles to New Mexico for the control of the Range Caterpillar. Later when the army worm had gone, the beetles came to the light and were found under the wheat sheaves. I believe that if it was not for the army worm there would have been no beetles. So far as the control is concerned, I found that the ditching was the only way. I did try poison, but there were too many of them, and they would go over it and get into the ditch and the corn.

Prof. Dearness: Regarding the sudden appearance of the army worm is there any explanation?

Mr. Gibson: It is not thoroughly understood how such insects increase in numbers so suddenly, but I believe, of course, that it is largely a question of parasites and weather conditions. As far as we know the army worm hibernates as a partly-grown caterpillar. We have been trying to find out definitely in what stage the caterpillar does pass the winter, but we have not been able to hear of any locality where specimens of the overwintering brood were located. One correspondent reported that he found four caterpillars of the fall brood on corn. These, however, were specimens of the corn ear worms. I should like to know if Mr. Baker has received any reports regarding this brood.

Mr. Baker: We received reports of the second brood, but found none on examination. All reports proved to be false. We have no definite record of any second brood this year. Any records we received proved on examination to be something else.

Mr. Gibson: In Nova Scotia Mr. Saunders spent several days searching for eggs and young larvae, but was unable to find any specimens whatever. Mr. Hudson also made search in Western Ontario, and investigations were also undertaken near Ottawa where the worms appeared, without results.

Mr. Baker: We have failed at Guelph also in securing the egg stage. We got one small cluster of eggs in the field, but no appearance of eggs in our rearing cages.

Prof. Dearness: Mr. Gibson mentioned that a large number of the moths had been taken on Sable Island. I suppose they were carried there by the wind.

Mr. Gibson: We intend to look up the records in this respect to find the direction of the wind during the days the moths were attracted to the lighthouses, but we have not yet been able to do so. Sable Island is 140 miles east of Nova Scotia.

The President: That observation regarding the occurrence of the army worm moths at Sable Island was more or less incidental or accidental. The primary reason for getting it was that we wrote to the Superintendent at Sable Island, which is under the Department of Marine Fisheries, in connection with our work on the Brown-tail Moth in order to get records of flight. We hoped to be able to get details as to seasonal flight, etc. of those moths attracted there by the Sable Island lights. We did not receive any Brown-tail Moths, but we got adults of the army worm which we happened to be working on at the same time.

Mr. King: At what date do the birds migrate? Would it be about the middle of May?

The President: I think Mr. Criddle would be better able to give you data regarding the migration of these two species of bird, or Mr. Calvert, but Mr. Criddle is in Manitoba which is more on the direct line of migration. There should be no migration during the time you speak of. There may possibly be, but the reason

would be that the red wing blackbirds and the Bobolink would find the presence of enormous quantities of these larvæ too much of a good thing, and would get out.

Mr. Criddle: My observation of the Bobolink is that the migration would be during the middle of May. The Red-wing Blackbird is a very early bird and arrives in Manitoba about the first week in April. It retires to the marshes to breed about the end of that month and this might account for their leaving the fields infested by army worms.

Mr. Swaine: Have you observed that they feed upon the caterpillars in the South to a great extent? I thought the Bobolink in particular was a grain feeding bird while in the Southern States.

Mr. Criddle: So far as I know, the Bobolink is certainly a rice feeding bird, particularly in the autumn, but in the north it is almost entirely an insect feeder. There are two distinct features in the bird's life. In the one case it is injurious but in the other beneficial. I think the United States Department in their laws have protected the birds at all times of the year, except in the rice growing region.

Prof. Lochhead: Can these men who have been in the field prophesy as to next season?

Mr. Baker: Everyone who has been in the field working on the army worm has been prophesying since the middle of June, and I think that—working on the basis of the fact that there is no appreciable second brood, and in view of the fact that it would be unique in the history of the army worm with us that there should be any second occurrence, I think we can say that there will be no outbreak next year. I have not been able to get any records of a second outbreak under such conditions as we have here.

Mr. King: There is a recurrence in Missouri and those States, frequently. In fact the army worm is present every year. That I think is not in the same class as our outbreak here, and also there is the fact that we had no second brood.

Mr. Gibson: The second brood would be very difficult to find and I do not think that this brood which occurs in autumn and over winter would ever be found to be injurious.

Mr. Baker: Not injurious, but present.

Dr. Bethune: Would they not become extinct if there were no second brood?

Prof. Lochhead: The conditions depend upon climatic factors and parasites. Climatic factors are very important. Two seasons would do it. All dry seasons—for instance, this season as far as Eastern Ontario was concerned—we had nearly a month or 26 days without rain during parts of May and June in Montreal—that held up as far as Ottawa, and last season was also a very dry one. These two factors seem to stand out as important in all cutworm attacks. The dry weather favours the development of cutworms.

Mr. Baker: In Brant County where the worst infestation occurred all the areas that were attacked, practically without exception, were flooded deeply in June. There were heavy rains early in that month and all the areas where the army worm fed were deeply flooded for a period I believe of two or three days.

## MOUNTAINS AND HILLS.

Rev. Dr. Thomas W. Fyles, Ottawa.

In that stretch of country which lies between Lake Memphremagog and the River St. Lawrence, the natural elevations are striking features of the scenery, and add much to its beauty. A continuation or spur of the Vermont passes through the Townships of Sutton, Brome, Potton, and Bolton; and in the lower country rise solitary peaks of remarkable formation—Shefford Mountain, Yamaska, Rougemont, The Pinnacle, Beloeil, Montarville, Mount Royal, and others. At the foot of Mount Royal, and rapidly extending around it, lies the City of Montreal. In this city, in the year 1861, I took up my abode.

Montreal, at that time, was a comparatively small and quiet place. A few particulars will help you to realize the change that has taken place in it.

Where St. George's Church, and the Canadian Pacific Railway Station now stand, there was then an orchard of *Pomme gré* and *Fameuse* apples, skirted by a lane which bore the name of St. Janvier Street. To the east of this was a large cemetery. Between Dorchester Street and Sherbrooke Street were vacant fields. The City of Westmount was then undreamt of.

The Grand Trunk Railway ran from a small and shabby station, on Bonaventure Street, to the main line at Lachine. Travellers for the east had to find their way to Point St. Charles as best they could.

In 1862 I began to form the collection of Lepidoptera which is now in the Provincial Museum at Quebec. My hunting-ground was the Mountain, and a productive one I found it. To reach it, I walked along the Côte-des-Neiges road, as far as the grounds of Judge McCord, who had a house built in form of a Grecian temple, with portico and columns. I had permission to pass through the premises at any time. Beyond the garden fence the mountain rose, steep, and rough, and thicketty.

One day, in the height of summer, I crossed the mountain brow, and a charming ing scene lay before me. There were a sugar bush, cultivated land, and a peaceful dwelling. The sun was bright; the air was still; and—

"The insect world was on the wing." I was well acquainted with the British Rhopalocera, and had a warm apprecation of its beauties, but here a new insect fauna was represented.

Dancing over the meadow-land, were scores of butterflies of the species *Argynnis cybele* Fabr.; and amongst them—smaller and less stately, but closely resembling them—were numbers of *Argynnis aphrodite* Fabr. Around the second growth trees at the borders of the clearing, *Papilio turnus* Linn. and *Limenitis arthemis* Drury sported gaily. I watched them with great delight.

But in this nook on the mountain top there were not only fine insects; there were beautiful birds. To mention a few there were:

The Blackburnian Warbler, *Dendroica blackburniæ* Baird.

The Yellow Warbler, *Dendroica aestiva* Baird.

The Red-eyed Vireo, *Vireosylva olivacea* Linn.

The Cedar Waxwing, *Ampelis cedrorum* Gray.

The Purple Finch, *Carpodacus purpureus* Gray.

Having come from the Old Country, where white butterflies abound, I wondered at the paucity of such in the scene before me. One or two specimens of *Pontia oleracea* Harris only, were to be seen. In Harris's "Insects Injurious to Vegetation" (Flint's edition published in 1862) this insect is well figured and its life history is given. Dr. Bethune also gave a good account of it in 1871, in the 2nd Report of our

Society. Since those days it has been strangely mixed up with the English *Pontia napi* Linn. It is now said to be one of several forms of this species. By a "form" I suppose is meant a variety that reproduces itself. I think we may fairly ask, Does the form ever return to the type? Has anyone ever raised *napi* from eggs of *oleracea,* or *vice versa,* has anyone ever raised *oleracea* from eggs of *napi?*

The mountain did not always present to me the charm of a smiling countenance. My duties as a Deacon in old St. George's under Archdeacon Leach and the Rev. W. B. Bond, often took me to Côte-des-Neiges; and friends there showed me a short cut over the mountain, which brought me out near the Reservoir not far from the head of Drummond Street.

On one occasion I was detained till nightfall, and a thunder storm overtook me on my way home. My walk was a dreary one, but I amused myself by stringing together these lines:

The Ethiop, Night, her darkest shadow flings;
With densest cumuli the sky is spread;
And solemn Silence, on her owlet wings,
Glides fitfully around the mountain's head.
The city's many lights below are scatter'd,
And, here and there, a fire-fly's lamp is seen,—
Ah, now the tempest comes! The clouds are shatter'd,
And from the Thunderer's hand the lightnings gleam.
Birches and pines above my pathway quiver;
And, for a moment, blue, unearthly bright,
The city and the mountains and the river
(Oh, wondrous fairy vision!) burst in sight.
A moment more, and deafening is the din,
As if high heaven's huge dome were tumbling in.

How wonderful is the illuminating power of the lightning! Not only the immediate surroundings were momentarily brought into view by it, the far-away mountains were also shewn. I wondered what sort of folk lived among those distant hills. I little thought that twenty years of my life would be spent among them. During those twenty years I gathered, and since that time I have been gathering scraps of information in Natural History, and with your permission I will say a few words respecting (1) some of the mammals; (2) some of the birds, and (3) some of the insects I have learned of.

## Mammals.

A few months ago my son Mr. Francis F. Fyles of Riverdale, Abercorn, Sutton Township, took me for an automobile ride up the Pinnacle, as far as the last farm on the shoulder of the mountain. On our way we passed two Skunk Preserves, or "farms" belonging respectively to Mr. Byron Spencer and Mr. Ernest Johnson. A short account of Mr. Johnson's farm appeared in *Rod and Gun* for May last, with an illustration showing the owner and four friends holding up live skunks each by the tail, but very little information is given respecting the animals.

The skunk-yard is enclosed with sheet-metal sunk to a considerable depth, and bent inward at the top, that the animals may not escape, either by burrowing or climbing. Snug dens are provided for the comfort of the animals, and divisions are made in the yard for their separation when necessary.

A few skunks captured by the aid of a dog, were placed in the pens. They rapidly increased in number, for the females bring forth from three to nine young at a litter. These are pretty little creatures as frolicsome as kittens. They are in their

prime in a year. To kill them the owner catches them up suddenly by the tail and strikes them a smart blow on the head with a stick. When lifted from the ground by the tail, they are unable to eject their offensive fluid.

Of the pelts there are four grades:

No. 1. All black, valued at from $3.00 to $4.00.

No. 2. Having a short white stripe, valued at $1.75.

No. 3. Having a long narrow white stripe, valued at $1.00.

No. 4. Having a long broad white stripe, valued at $0.50.

These values are per skin (prime).

The skunks are not costly stock. They are fed upon corn-bread, johnny cake, potatoes, green corn, scraps of meat, etc.

Strange to say the fetor of the skunk is not repulsive to every one. An English gentleman came to see me when I lived at South Quebec. He was interested in Natural History. In the course of the evening I went to my front door. A skunk had passed over the lawn in front of it, and left a strong taint. I called to my visitor, "Sir, there is something here you should know of." He came, and sniff! sniff! "What is that? What is that? Do you know I rather like that." Well, every one to his taste.

In a state of nature the female skunk chooses for her abode a deserted Woodchuck's burrow lining the chamber with leaves and grass. There she brings forth and suckles her young, blanketing them with her ample tail. Notwithstanding her ill savour, she should be ranked among the farmer's friends, for she lives—as does her mate—on grasshoppers, crickets, June beetles, white grubs, cutworms, and other pests. Of course she should be kept from the poultry houses.

The skunk is not at all a shy animal, it seems to be conscious of its powers. One day I was walking by a wood-side, when I saw a skunk, and it saw me. It came trotting towards me, but I respectfully declined a closer interview, and hurried away as fast as I could with dignity.

The Woodchuck (*Arctomys monax*) is an animal familiar on our hillsides. It is a vegetarian, and does mischief in our fields and gardens. I shot one of these creatures that had a burrow on my land in Brome, intending to make a drawing of it, but, when I came to take it up, I found that it was covered with ticks. The number of these was incredible. When their host died, they let go their hold on its flesh, and came to the outside of its fur.

Once on a time I witnessed a battle royal. Behind the Missisquoi High School at Cowansville (which belonged to the English Church) I had a large garden. At the back of the school stable, a load or two of stones were piled. On a certain occasion I went to my garden followed by my little dog, Pepper, a Skye Terrier. A woodchuck ran from among the vegetables and disappeared in a burrow it had made under the pile of stones. Pepper was at his heels and followed him into his den. I was aware of a desperate underground struggle. The woodchuck whinnied like a horse. It was heavier than its opponent, but the dog prevailed. It not only killed the woodchuck, it dragged it out of its den. But so exhausting had been the struggle that the little victor threw himself on its side, stretched out its limbs, and lay as if dead. I began to think it was dead. But in ten minutes it arose and shook itself, and after receiving my commendations, followed me complaisantly home.

Since the game laws have been more strictly enforced the red deer (*Odocoileus americanus*) has often been seen on our hillsides.

My son has a wood-lot and pasture about a mile from his home in the valley. On several visits to these he saw two deer companionably grazing with his young stock.

The Fox (*Vulpes pennsylvanicus*) is still common in the hill country. Travelling in the train on one occasion I saw, through the car window, a fox hunting for mice and ground birds in the meadows below. The animal paused, lifted up its head, and with the utmost nonchalance watched the train go by.

Among other wild animals that frequently, or occasionally visit our mountainous districts, are the Bear (*Ursus americanus*), the Lynx (*Lynx canadensis*), the Raccoon (*Procyon lotor*), the Porcupine (*Erethizon dorsatus*), the Hare (*Lepus americanus*).

A hunter told of seeing tracks of a Sable (*Mustela americana*) on Round Top, the highest of the Sutton peaks.

## Birds.

Of birds that are seen on our hills many are summer visitors. These mostly arrive about the 10th or 15th of May. I saw, season after season, in the maple woods near the frontier that handsome bird the Scarlet Tanager (*Piranga erythromela,* Vieill), and his modestly attired mate. The notes of the male somewhat resemble those of the robin.

The Rose-breasted Grosbeak (*Habia ludoviciana,* Linn.) was another fine bird that now and then adorned the fields and woods.

Welcome to every one was the dear little Bluebird (*Sialia sialis sialis,* Linn.) which came to cheer us with its sweet notes, and to render its services to the husbandman and fruit grower.

Wilson thus sings in its praise:

"He flits through the orchard, he visits each tree,
The red-flowering peach, and the apple's sweet blossoms;
He snaps up destroyers wherever they be,
And seizes the caitiffs that lurk in their bosoms;
He drags the vile grub from the corn it devours,
The worms from the webs where they riot and welter;
His songs and his services freely are ours,
And all that he asks is in summer a shelter."

One day, approaching a stump about six feet high, I disturbed a female of this species. She had a nest in a hole near the top of the stump and in it were five bluish eggs.

The American Goldfinch (*Astragalinus tristis,* Linn.) is another welcome visitor. I found a nest of this species in a bush by the road-side, on one of my early excursions on Mount Royal. It was beautifully formed, compact, and lined with down. In it were five white eggs tinged with blue.

When we lived at South Quebec, my wife purchased a young canary from a cottager at Hadlow. The woman said to her, "Here is a little bird I should like to give you. I bought it when it was a fledgling from a boy who had robbed a nest; and it has been brought up with the canary. The birds would be lonesome apart." My wife took it; it was a goldfinch and a great pet it has proved. In the spring it assumed its lovely golden dress—the *toga virilis* of its kind. This it puts off in its September moult.

When we moved to Hull the two birds were put in one cage which was wrapped in a shawl. When uncovered it was found that the goldfinch had been injured in one eye. It lost the sight of it. Then the other eye was affected, and it became totally blind. It seems to have become quite reconciled to its lot.

It is interesting to mark the tokens of perfect confidence it has in its mistress. It hears her voice; and it calls to her for its morning greeting. It comes to the

wires of its cage to welcome her. When it is time for its bath, of which it is very fond, she puts in her hand and it hops upon her finger and she places it in the water. When it has been in long enough she again lends it her finger and lifts it into its swing. There it shakes itself and preens its feathers till dry.

To give it occupation its mistress scatters some grains of hemp on the bottom of the cage. These are a great luxury. It turns its head sideways and gropes on the floor with open bill, and not a grain escapes it. It knows when its seed and water are changed and when a lump of sugar, a dandelion, a bunch of chickweed, or a stalk of plantain is placed in the wires of the cage for its delectation. It likes to be placed in the balcony where the busy twitter of the sparrows amuses it. It carols all the day and at night-fall it climbs to its swing and rocks itself to sleep.

I will speak of only one other bird, the Ruby-throated Humming Bird (*Trochilus colubris,* Linn.).

I found a nest of this bright and active little creature on a branch of a young birch tree which overhung a mountain rivulet. The structure resembled a knot of the tree and was covered with lichens and fragments of bark. From my station on the bank of the stream I could look down into the nest and see the two tiny white eggs. When the mother bird took her place on the nest the green of her upper plumage harmonized with the tints of the nest and its surroundings and made its disguise complete.

The male bird is a bold, dashing little fellow. He comes before you—his gorgeous breastplate flashing in the sun, and—*presto!* he is gone!

For the guidance of these, and other dependents on its bounty, a beneficent Providence hangs out gaily painted signs, to shew where stores of nectar may be had, by the thirsty without cost.

## Insects.

The insects are "*in number numberless.*" Winn has given in his List—of Quebec Lepidoptera only, the names of 1,191 species. Lest I should weary you, I will confine my remarks to one genus only—that of *Catocala*—the beautiful Underwings.

The word Catocāla is often pronounced in the Old Country Catócala. The genius of the English language is to throw the accent back. We do not say Catastrōphe but Catas'trophe—though this word is also from the Greek.

The first Catocala I saw in Canada was in the maple wood on Mount Royal, which I have mentioned. I thought at first that it was the rare English moth, *Catocala fraxini,* Linn.—"the Clifden Nonpareil," but when it spread its wings I saw that I was mistaken; it had not the deep blue underwings of *C. fraxini.* It was *C. relicta,* Walker—"the Relict."*

I found *C. parta,* Guenée—"the Mother,' to be plentiful in Brome. This insect has scarlet underwings.

*C. concumbens,* Walker—"the Sleepy One," which has fine magenta underwings, was also rather common in the same locality.

*C. cerogama,* Guenée—"The Yellow-belted," I took on Cape Diamond, Quebec.

The beautiful form of *C. ilia,* Cramer, viz.—*C. osculata*—"the Beloved" I took in East Farnham, and there also I captured *C. subnata,* Grote—"the Youthful."

*The English names I use were those given by Holland, in his "Moth Book."

*C. unijuga,* Walker—"the Once Married," and *C. briseis,* Edwards, I took at Cowansville.

That beautiful moth *Catocala bianca,* Henry Edwards, I found at rest on a fence on the Heights of Abraham.

Some, if not all of these insects may, I dare say, be found in the lowlands, but all my captures of them were made in elevated regions.

I have spoken of the beauty of some of the living creatures that frequent our mountain districts. I will say in conclusion a few words on the lovely scenery that those districts present. I do not think I fully realized this till one day when driving from Waterloo to Magog (between which places a railway now passes) I met with John A. Fraser, the artist.* He was lodging at a cottage by the wayside, and was engaged in painting a view of Mount Orford and Orford Lake. He had portrayed the mountain as it appears at early morning, with the glow of the rising sun lighting up its higher projections, and contrasting finely with the deep shadows of its wooded recesses; while in the water below the charms both of colouring and outline were reflected.

But I think the most wonderful mountain view I ever witnessed in the eastern townships was an evening scene. To understand it you must remember that early in spring, before the buds open into leaf, the young twigs of the maples are deep red.

I was driving under the long western front of Gale Mountain, in East Farnham. The slope was clothed with maples from head to foot. The sun was setting in all its regal splendor over the low-lying French country; and its crimson beams struck full upon the ascent. The effect was marvellous—it can hardly be imagined. The whole slope glowed and sparkled with the lustre and tint of rubies. As I recall the scene the words in the Canticle—*Benedicite, omnia opera*—rise spontaneously to my mind, and furnish a fitting close to my address. "O ye Mountains and Hills, bless ye the Lord, praise Him and magnify Him forever."

THE PRESIDENT: I am sure I am voicing the feelings of all who are here when I say that we could not have enjoyed this paper with anything like the same degree of pleasure, had Dr. Fyles sent it to be read by someone else as an alternative to coming and reading it himself in his own inimitable way. We are so pleased to find from his paper that his pen has lost none of its beautiful descriptive power, and from the illustrations on the screen that his hand has lost none of its cunning. We hope that we shall continue to receive these papers from year to year as long as Dr. Fyles is able to give them to us. I have already suggested to him the subjects of two future papers for next year's meeting and that of 1916!

*John A. Fraser was an English portrait painter who came to Canada and worked for William Notman, the noted photographer of Montreal. Fraser became a charter member of the R.C.A. in 1880. He died in 1898. Two pictures from his hand are in the National Art Gallery of Canada.

## EXPERIMENTS WITH POISONED BRAN BAITS FOR LOCUST CONTROL IN EASTERN CANADA.

ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT OF AGRICULTURE, OTTAWA.

During 1914 we had an opportunity of testing out on a fairly large scale the value in Eastern Canada, of the Kansas formula for the destruction of locusts.* This formula which was originally experimented with by Mr. F. B. Milliken, when employed by the Kansas Experiment Station† consists of:

| | |
|---|---|
| Bran | 20 lbs. |
| Paris green, or white arsenic | 1 lb. |
| Syrup (molasses) | 2 qts. |
| Oranges or lemons | 3 fruits. |
| Water | 3½ gals. |

In preparing the bran mash, mix the bran and Paris green, or white arsenic, thoroughly in a wash tub while dry. Squeeze the juice of the oranges or lemons into the water, and chop the remaining pulp and the peel to fine bits and add them to the water. Dissolve the syrup in the water and wet the bran and poison with the mixture, stirring at the same time so as to dampen the mash thoroughly.

Bran and Paris green with sweetened water had, of course, been previously used in the United States, as well as in Canada, for the destruction of locusts. In Fletcher's reports as Entomologist and Botanist to the Dominion Experimental Farms, frequent reference is made of the success obtained in the use of bran poisoned with Paris green. Near Douglas, Man.,§ where an application was made, he records having counted 117 dead locusts in 18 inches square. In 1901, Mr. Norman Criddle, now Field Officer of the Entomological Branch, co-operatively with the farmers in his immediate district used large quantities of bran and Paris green and enormous numbers of grasshoppers were killed. In the same year he tested out on a large scale the value of horse manure as a substitute for bran and this was found to be a decidedly better remedy. The day after the first application an average of 25 dead locusts was found to the square foot, while many more were dying.

Bran and arsenic have also been used in the control of locusts for many years. In 1885, Coquillett used a mixture of arsenic, sugar, and bran, to which was added a sufficient quantity of water to make a wet mash. This mixture was experimented with in California where about 300 acres of orchard and vineyard were treated, and in about two weeks after the application scarcely a living locust was to be seen, the ground in many places being covered with the dead insects. In 1888, bran, sugar and arsenic were used by Fletcher at Ottawa and large numbers of locusts were killed.

The results of the experiments conducted in Kansas in 1913 showed conclusively that the addition of the fruit—oranges or lemons— made the bait more attractive and appetizing, and consequently was eaten by more of the locusts. Prof. Dean, Entomologist, Kansas State Agricultural College and Experiment

*The species chiefly responsible for the destruction to crops was the Lesser Migratory Locust, *Melanoplus atlanis*. Associated with it, however, to a comparatively slight extent, was the Pellucid Locust, *Camnula pellucida*.

†For an account of this work see "Grasshopper Control in Western Kansas," by Geo. A. Dean, in *Journal of Economic Entomology*, Feb'y, 1914, p. 67.

§ Report Ent. and Botanist, Dom. Exp. Farms, 1901, p. 223.

Station, referring to the application of the mixture, states: "The damp mash or bait should be sown broadcast in the infested areas early in the morning, on about the time the grasshoppers are beginning to move about from their night's rest. It should be scattered in such a manner as to cover five acres with the amount of bait made by using the quantities of ingredients given in the above formula. Since very little of the bran is eaten after it becomes dry, scattering it broadcast in the morning, and very thinly, places it where the largest number will find it in the shortest time. Sowing it in this manner also makes it impossible for birds, barnyard fowls, or live stock to secure a sufficient amount of the poison to kill them. Inasmuch as the poisoned bait does not act quickly it will be from two to four days before the grasshoppers are found dead, and these will be more numerous in the sheltered places. It does not require much of the poison to kill them. Even a small portion from one of the poisoned flakes will be sufficient to cause death."

In view of the remarkable success in Kansas in the control of locusts, by adding to the poisoned bran the juice of lemons or oranges, the Entomological Branch decided to test out this remedy, near Ottawa, and also to experiment with other mixtures. These experiments were conducted at Bowesville, where a large section of the country is heavily infested with these insects. The results obtained were indeed very promising and would indicate that the Kansas formula, particularly when lemons are used, will be found of equal value in Canada, at least in the Provinces of Ontario and Quebec. In addition to the Bowesville experiments, applications were also made, under our direction, in Quebec Province near St. Etienne de Gres where locusts have been extremely destructive, and owing to which farms, on which the insects have been breeding for several years, have been abandoned.

The initial Bowesville experiments were conducted on the farm of Mr. Freeman, Sr., and we are particularly grateful for assistance received from Mr. Dowler Freeman. On June 18, I visited Bowesville and arranged to treat five different fields, of about four or five acres each, with the following mixtures:

| | | |
|---|---|---|
| Field No. 1— | Bran | 20 lbs. |
| | Paris green | 1 lb. |
| | Molasses | 2 qts. |
| | Bananas | 3 |
| | Water | 3½ gals. |

Field No. 2.—Same as 1 with juice of 3 lemons instead of 3 bananas.
Field No. 3—Same as 1 with juice of 3 oranges instead of 3 bananas.
Field No. 4—Same as 1 but with no fruit and instead of 3½ gals. of water, 3 gallons and 1 half gallon of coal oil.
Field No. 5—Criddle Mixture.

These five mixtures were applied as soon after the above date as weather and time would permit. The locusts were very numerous and only a few, comparatively, had wings. The mixtures were broadcasted early in the morning and counts were made four days later in all the fields except that in which the mixture containing the oranges was used. Unfortunately, owing to a misunderstanding no counts were made in this field. The following are the results obtained:

Field No. 1—35 to 75 dead locusts to the square yard.
" " 2—50 to 414 dead to the square yard.
" " 4—Average 35 dead to the square yard.
" " 5—Average 50 dead to the square yard.

As regards the mixtures containing the fruit, that with lemons will probably give the best results. This fruit too is easily squeezed and of course, is cheaper than oranges.

As a result of these experiments, Mr. W. D. Jackson, the District Representative of the Ontario Department of Agriculture for Carleton County arranged to supply bran, molasses, Paris green and lemons—sufficient to treat 400 acres— to the farmers in the immediate district where the locusts were abundant. On June 30, accompanied by Mr. Jackson and his assistant Mr. Waterman, five farms were visited where it had been decided to apply the mixture. At this time the locusts were mostly in the winged condition although a number were still in the hopping stage. Within a week after the application counts were made diagonally across oat fields, etc., and these gave from 13 to 124 dead locusts to the square yard, the average being 57. The farmers of the district reported later that they were well pleased with the results of the experiment.

In addition to the Bowesville experiment at our request the Rev. J. I. Trudel and Rev. E. Fusey arranged to treat fields in their parishes, St. Etienne de Gres,

Fig. 19.—Corn Field, Bowesville, Ont., devastated by Lesser Migratory Locust. (Original).

and Valmont, Quebec, and in this Province even better results were obtained with the Kansas formula. Some farmers used lemons, and some oranges, and a stronger strength of Paris green was used, viz., 1½ lbs. to the 20 lbs. of bran. The Rev. J. I. Trudel reports that eight days after the poisoned bran was broadcasted counts were made in various fields and these gave from 900 to 1,200 dead locusts to the square yard. These results are certainly very remarkable. At the time of the applications the locusts had their wings and were migrating from one place to another.

In treating large areas with such a mixture, it is of the utmost importance in order to secure the results desired—that is the destruction of a very large percentage of the locusts—to make the applications while the insects are in the hopping stage and before they begin to migrate. Farmers should make special arrangements to co-operate and apply the mixture at the same time. This was done in Kansas and, as a result, from 60 per cent. to 80 per cent. of the insects were destroyed. Prof. Dean states: "The remaining grasshoppers were so left to the mercy of the parasitic and predaceous enemies that only a few of them escaped."

THE COST OF APPLYING THE KANSAS FORMULA.

| | |
|---|---|
| At Bowmanville, Ont. | |
| 100 lbs. bran | $1 25 |
| 5 lbs. Paris green | 1 25 |
| 2 gals. molasses | 1 00 |
| 15 lemons | 0 30 |
| Labour, 6 hours | 1 20 |
| | $5 00 |

Applying 20 lbs. of the bran to 4 acres the cost comes to 25 cents per acre.

| | |
|---|---|
| At St. Etienne des Gres, Que. | |
| 20 lbs. bran | $0 25 |
| 1½ lbs. Paris green | 0 38 |
| 2 qts. molasses | 0 22 |
| Fruit | 0 05 |
| | $0 90 |

In this locality the 20 lbs. was scattered over 5 acres, the cost being 18 cents per acre, exclusive of labor.

Mr. R. Davey, of Tyrone, Ont., used the Kansas formula during the past season and he informs me that the cost was about 20 cents per acre.

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THE PRESIDENT: This subject is naturally one of very great interest to Canadians, because locust control has become a very serious question with us in many parts of Canada. We were very fortunate in being able to make use of the results of the Kansas people and also in discovering that their formula gave such good results in the first season. It is particularly important in Quebec where it is not generally realized how serious the locusts are. I had a long conversation with Fathers Fusey and Trudel regarding the outbreak of locusts in the Three Rivers region, in the neighborhood of Valmont. In that region where the soil is sandy the results have shown that the mixture killed upwards of 1,200 locusts to the square yard. This shows not so much the effectiveness of the mixture as the abundance of the locusts in that region, and so serious are they that large numbers of farms have been abandoned and people are leaving the district. When a situation like that arises, locust control becomes a serious question, and is raised from being an interesting problem to the entomologist to an important economic question. Mr. Gibson has not mentioned the fact, but it may be interesting to those present to know that the Entomological Branch has also been carrying on some experiments in the use of the bacterial disease, the *Coccobacillus* of Dr. Herelle of the Pasteur Institute, Paris, France. Two years ago through the kindness of the Director of that Institute, I was able to obtain some of Dr. Herelle's culture from Paris, and last year (1913) Mr. Petch, who had charge of this work, carried out some preliminary experiments at the laboratory at Covey Hill, Que., where he found that the bacillus was pathogenic for Canadian species, which is interesting, but owing to the conditions we were not able to try it out on a large scale. We continued the experiments this year with the same results both regarding the *Coccobacillus* being pathogenic to our species, and in being unable to obtain results on a large scale. The failure of the experiments in the field was not so much due to the fact that the *Coccobacillus* cannot be utilized under field conditions, but to the fact that we had to send the bouillon culture so far from our laboratory. Our laboratory was in Quebec, and it had to be shipped to Montreal and thence to Ottawa. The conditions are such that the culture does not remain in a viable condition more than 48 hours.

Mr. Gibson: This year we were able to get it to the locality where it was tried out within 16 hours, and under ideal conditions.

The President: But unfortunately without good results. The failure may be due to the fact that we had to transfer it from the place of manufacture to the place where it is used. In its manufacture you have to carry out so many experiments. First it is necessary to inoculate one series of grasshoppers. Then you have to take the virus from them and to go through at least twelve series of grasshoppers, sometimes fourteen or sixteen. You then make the bouillon and this is used to prepare the final fluid. Next year all being well, I propose to move the seat of the experiments, if it can be arranged, to this district in Three Rivers, and have it right in the locality where the locusts are so abundant, in the hope of trying it out there. Whether it will be successful or not, it is difficult to say. It is claimed that they have had success with it in the Argentine and also in Northern Africa. But whether we can secure success in Canada remains to be seen. I do not think it will ever take the place of the Kansas formula, because its use necessitates the presence of a bacteriologist and bacteriological plant to manufacture the bouillon, and the facilities in regard to getting it away to outside points is somewhat limited. Unless therefore, there was an unusually severe outbreak which would warrant the locating of a laboratory of that kind, it might be preferable to use the more simple poisoned bran remedy.

Prof. Caesar: I have tried the Kansas remedy too, and have had a number of district representatives try it. They have all been well pleased. There are three little matters which I should like to refer to in connection with this. First in regard to the cutting of the pulp and rind of the lemons. If you run them through a meat-chopper it is handiest and the quickest way you can find. The second point is in regard to the amount of water. I myself used considerably less water than the Kansas people and Mr. Gibson. I only use two gallons where he uses three. I find that to be eminently satisfactory, and the reason I did it was because I had used the bran on other occasions and found that with a smaller amount of water it was easier to get the bran into the form of sawdust which form is necessary. It must go through the fingers easily. Third in applying it, it is not necessary to cover every foot of ground, because the grasshoppers move here and there. I made about 2½ gallons of it to over an acre. It will go over an acre and a quarter just as easily. Twenty pounds are sufficient for five acres. I take a handful of it and scatter it much as I should if sowing grass seed. It is not at all necessary to cover the ground uniformly. You may miss some here and there, and it makes very little difference. The number of insects you are going to get to each square yard depends entirely upon the number there are. I have never found so many as Mr. Gibson did. I think 120 was the largest number I got.

Mr. Criddle: As regards locust work in Manitoba, we have not used the Kansas bait yet owing to the fact that the locusts were scarce this year, but I find that a very important factor is that of temperature and, of course, moisture. I do not know whether it has been noticed here, but the grasshoppers in our district do not come out at all when the temperature is below 50 degrees. We have tried the poison bran on cold days but with no results. The hotter and dryer days gave the better results. In that respect moisture plays a very important part. In fact if you put out an ordinary pail of water and put in a little sugar to sweeten it, the grasshoppers will be attracted for at least fifty feet around and drown themselves in the pail. We have only tried the horse manure and bran and that sort of thing. In the case of horse manure in Manitoba, I have noticed horses go 100 yards or more

into a green field and leave droppings and presently thousands of grasshoppers would be there. That is where we originally got hold of the idea of using manure. I should like to ask whether such fruit as lemons, or other substances attract the grasshoppers in that way from a distance.

MR. GIBSON: In a recent paper published in the *Journal of Economic Entomology,* S. J. Hunter and P. W. Claassen gave an account of a number of experiments which they carried out in Kansas in placing out fruit juices to attract grasshoppers, and they found that they would come very considerable distances, attracted by the aroma of the fruit.

THE PRESIDENT: I was in Atlanta, Georgia, last year when these two papers were read by Professor Dean and Hunter, and they dwelt particularly upon the fact that it was the lemon that was the attractive quality, and they described, as you have, how many feet they would travel to reach it.

MR. CRIDDLE: I recently tried some experiments with sawdust in place of bran. Sawdust can be obtained for practically nothing in our district. In the ordinary way with salt added I got just about the same results as with bran. In Manitoba the grasshoppers have a habit of coming to anything which you may be holding attracted by the salty flavour left through contact with the hands. That induced me to try sawdust with salt added. It would be interesting to try further experiments along that line.

THE PRESIDENT: The plan which Mr. Criddle has suggested would be very useful in the Three Rivers District where you can get sawdust practically for nothing, and it is difficult sometimes to get either bran or horse manure. That would be a very useful thing for the farmers, and would cut down the cost considerably.

PROF. DEARNESS: I noticed a question raised in the reports as to the different kinds of fruit. It reminds me of the concession one of my pupils got at the World's Fair for selling Orangeade. He told me that he used about three oranges per barrel. The material he added to that was not directly allied to the oranges, and I think there was some cheap material that was added to intensify the effect of the fruit. It might be possible, in order to obtain greater acidulation, to use some cider or soured liquor of some kind. This might be experimented with with a view to getting something which would attract these insects still further. If there is any particular virtue in the lemon over the orange or banana, it would be either in the taste or in the odor and it would be a matter of experimentation to get something which would be better than either.

THE PRESIDENT: Either Prof. Dean or Prof. Hunter did carry out experiments with essential oils and chemicals of that kind which are the bases of the pungent qualities of these fruits.

MR. KING: I have used apples with the poison for the Fall Army Worm larvae and they have travelled towards the place, but I do not know whether that was due to the apples.

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## AN IMPORTED RED SPIDER ATTACKING FRUIT TREES.

By L. CAESAR, O. A. C., GUELPH.

In the autumn of 1912, when examining the leaves of European plum trees that were severely attacked by what at first was supposed to be our common Red Spider, *Tetranychus bimaculatus,* though the mites themselves were not seen, my suspicions were aroused that it was some other mite and not *T. bimaculatus* that was

the offender. The reasons for these suspicions were: first, that the few unhatched eggs were red, whereas the eggs of *T. bimaculatus* are almost colorless; second, there was no visible fine web underneath the leaves as in the case of *T. bimaculatus;* third, the eggs were on both surfaces, being very common in the furrow of the midrib of the upper surafce; and, fourth, all the eggs were attached directly to the surface of the leaf. These last two characteristics are for the most part contrary to the habits of *T. bimaculatus.*

In 1913, having again found numerous trees affected in the same manner and the mites causing the trouble present in large numbers, I sent specimens to Mr. Nathan Banks of the Bureau of Entomology, Washington, D.C., who at first thought they were *Tetranychus mytilaspidis,* the Southern Red Spider, which attacks citrus trees, and which he supposed had escaped from the greenhouse. On sending further material with some account of the wide territory over which the mite was being found, together with its host plants, he answered as follows: "The red mite on the

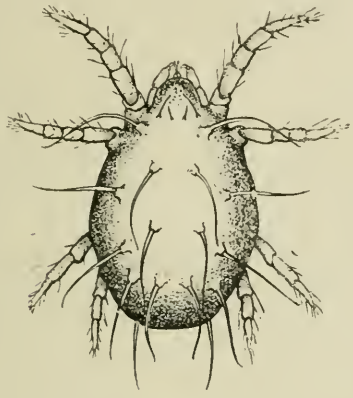

Fig. 20.—Imported Red Spider. (*Tetranychus pilosus.*)

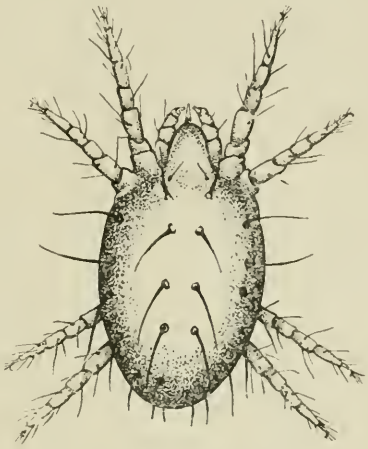

Fig. 21.—Common Red Spider. (*Tetranychus bimaculatus.*)

plum is the European *Tetranychus pilosus,* which occurs there on pears and other fruit. Its relation to *T. mytilaspidis* is very close and perhaps identical, but the latter species has been only known to us from the south and mostly on oranges." He stated further that this was the first record of *T. pilosus* in America and asked for more material and data, which were at once forwarded.

## Description of Appearance of Tetranychus Pilosus as Seen Under a Hand Lens.

The mites are about the same size as *T. bimaculatus,* but are stouter and more nearly circular in outline of body. Unlike *T. bimaculatus,* the females are apparently always, even in the immature stages, red in colour. The mature females are dark red, some being decidedly blackish, but the mouth parts and often a median dorsal longitudinal area, especially on the posterior half of the body, are paler red. The ventral surface is paler than the dorsal. The legs are whitish, tinged with red. On the dorsal surface are a few small, whitish tubercles arranged in parallel rows. Four longitudinal rows with three tubercles in each can easily be seen. There are, however, more tubercles but not easily made out with a hand lens. From each tubercle

a fine, whitish hair or bristle arises. The legs, as in the case of *T. bimaculatus,* do not differ much in length. The front pair is held extended in front of the body when at rest.

From this description it will be noticed that the easiest way of distinguishing this species from *T. bimaculatus* is the presence of the whitish tubercles on the dorsum, each with its fine hair. These tubercles are not present in the latter species.

Copulation was not observed, but smaller, more slender, adult mites, evidently males, were frequently seen caressing females after the manner of the males of *T. bimaculatus.* These resembled very closely the males of the latter species, and were yellowish-white anteriorly with darkened abdomen, sometimes strongly tinted with red.

### Distribution in Ontario.

I have found the mites very widely distributed through the Province from Prince Edward County on the east to Lambton County on Lake Huron on the west, and from Guelph in the north to St. Catharines in the south. There seems, therefore, very litle doubt that further observations will show that they occur all over the fruit growing parts of the Province.

### Food Plants.

Up to the present this Red Spider has been found on European plum, apple, sour cherry, pear, peach, hawthorn, mountain ash and rose. It probably occurs also on sweet cherry and Japanese plum. The favorite host plant by far is the European plum, and in searching one is always sure to find it on the leaves of this tree if present anywhere in the orchard. The apple is apparently the next choice, and then sour cherry. Pears, peaches, mountain ash and roses are very little attacked in my experience, and Japanese plums alongside European varieties have apparently been untouched. A few hawthorn trees have been badly attacked, but these seem to have been exceptions rather than the rule. No other plants have so far been seen to be infested.

### Nature and Extent of the Injury.

The injury is caused in the same way as that of the Red Spider, *Tetranychus bimaculatus,* and resembles this to a large extent. Feeding, however, takes place on both surfaces of the leaves. Badly infested plum and apple foliage looks at a distance as if it had been covered with very fine road dust. On closer examination it can be seen that the upper surface of the leaves is studded thickly with fine whiteish blotches. With the further feeding of the mites many of the leaves turn brownish, thus giving the foliage the dusty appearance just referred to. Whole plum, and in a few cases, whole apple orchards, have been affected in this way. Often, however, only a few of the trees are severely attacked, and sometimes very little damage is done. Some seasons the mites are much worse than others. They were worse last year at Guelph and in Niagara than this year. It is difficult to estimate how much damage even a bad infestation causes. Perhaps as much as one should say is that it must interfere considerably with the function of the leaves in manufacturing food, and so weaken the tree and lessen its power of producing large crops of good sized fruit. It is not probable that the mites would ever kill a tree though they might so weaken it that it would succumb to a very severe winter. It can, however, safely be said that on fruit trees this is at present much the most destructive of the Red Spider type of mites in Ontario.

### How Long the Mite Has Been in Ontario?

The chief means of distribution is doubtless on nursery stock and by birds and flying insects. These agencies may soon distribute a pest over a great deal of territory, but from the fact that the Blister Mite (*Eriophyes pyri*), though known in the province for many years and distributed in the same manner, has not yet reached nearly all our orchards, it seems clear from the wide distribution of this mite that it is no recent importation, but has been here for many years and has hitherto been mistaken for the Red Spider, *T. bimaculatus*.

### Life History So Far As Observed.

The winter is spent in the egg stage. The eggs are small, globular and blood red, and are deposited in great abundance in the axils of branches and twigs on infested trees. Many eggs were found also in the calyx and stem ends of apples. Egg laying was observed this year (1914) on October 7th, but many had been laid before this date. Not a few adults were still present at the above date on the leaves. Until last year (1913) the writer had supposed that these eggs had all been deposited by *Bryobia pratensis*, but having actually seen *T. pilosus* laying the eggs, and noticed that infested trees regularly had these eggs whereas uninfested ones were almost without them, he is convinced that so far as Ontario is concerned the most of these eggs are laid by this new species, and not by *Bryobia pratensis*.

It may be worth mentioning that as soon as a female of *T. pilosus* deposited an egg she spent approximately a minute in fastening a few silken threads to or or over it, apparently with the object of holding it in place. *T. mytilaspidis* has, I believe, the same method of attaching her eggs.

At Guelph this year the eggs hatched about the time the leaves on the European plums were expanding viz. about May 15th. The exact date was not determined, but it was some time after the buds had burst. On May 23 little, immature, red mites were found and brought into the laboratory. By May 27th these had become adults and were then easily identified. By May 28 a few eggs were laid on the leaves of a well sheltered European plum tree in the writer's garden. The winter eggs had probably hatched earlier on this tree than in the average orchard.

No study was made of the length of the incubation period of the eggs, nor of the larval stages or number of generations a year. It is evident, however, from the rapid rate of increase that there are many generations and breeding continues right up to the cold weather in autumn. The severe frosts then evidently kill off all the adults.

### Control.

A tree badly infested in the early part of this summer was seen to be almost free from mites in August. It was also noticed that in the Niagara district the mites were not nearly so numerous as last year, whereas in Norfolk County they were still very abundant in October. It is, therefore, apparent that there is some natural means of control that is very helpful, but what this is was not discovered. A year ago when the mites were very abundant on an isolated European plum tree the writer had this thoroughly sprayed with the ordinary summer strength of lime-sulphur, the spray being applied to the under surface of the leaves. The result was very satisfactory. It is very probable, therefore, that where orchards are badly infested the mites can be controlled by using lime-sulphur instead of bordeaux mixture for the

ordinary sprayings and giving an extra application about August 1st or as late as safe before the fruit is ripe. It is clear, however, from the presence of the mites in scale infested areas where strong lime-sulphur is used before the buds burst, that this mixture will not destroy the eggs.

PROF. DEARNESS: I should like to ask how the eggs of *Bryobia pratensis* can be distinguished from these of this new species.

PROF. CAESAR: There does not seem to be any way of distinguishing them.

PROF. BRITTAIN: Has anybody noticed in Ontario or the Maritime Provinces that so called rusty leaf or silver leaf mite? It has occurred in British Columbia causing this silvery appearance on the leaves to be mistaken for a disease called Silver Leaf. When I left British Columbia, I took with me Northern Spy nursery stock which had these incrustations. It makes very unsightly looking nursery stock. This year the mites came out proving it to be the same species. It makes these incrustations and spoils the appearance of the bark. It does not do any harm. They do not seem to flourish in British Columbia, but they have found mites of the same species in King's County, so they are apparently found there too. It is well distributed in North America, in Washington, Oregon and New York State, so there is nothing surprising about it. There is another mite in British Columbia which makes its appearance on leaves. It causes raised blisters, black in colour or very dark. The mites are on the under side hidden among the hairs and are never found much unless you look with a microscope. I saw some leaves on apple trees with marks which looked as if they might be there. Has anybody found that mite in Eastern Canada? I have seen botanists deceived by it more than once, thinking they had the apple scab. In fact it has been diagnosed as apple scab frequently.

THE PRESIDENT: Mr. T. Jarvis is more of a specialist on these mites, but that question as to the Phytoptid mite is very interesting. Prof. Crosby is probably interested in the matter because he may have had similar experiences. Three years ago Mr. Güssow, the Dominion Botanist, and I first received specimens of this northern spy nursery stock from the Coldstream Nurseries in British Columbia bearing these reddish brown incrustations to which Prof. Brittain has referred. I am not sure, but I think the stock at the time was being condemned as being diseased and not fit for sale, and it was sent up to have the disease determined. I looked into the matter personally and examined quite a number of these young seedlings, and found the characteristic small tubercles which are caused by the *Empoasca* when it deposits its eggs. I found the egg of this insect and naturally assumed that this was the cause of the trouble. The next spring we reared the larvae of *Empoasca mali* from the tubercles which later took the form of incrustations where the bark was ruptured. At that time the silver leaf on the apples in British Columbia was attracting attention. I do not know whether it was Prof. Brittain himself or in conjunction with Mr. Güssow, who discovered that there were two kinds of silver leaf, one caused by the *Stereum* and the other caused by the little Phytoptid mite which I believe also causes silver leaf in peach, I think the original record from North America was on peach. Later we had further samples sent of these seedlings bearing incrustations. Mr. Dash of the Provincial Horticultural Department found these Phytoptid mites under the brown incrustations which we said were due to the emergence of the *Empoasca* larvæ. We corresponded about the matter each referring to the same thing though believing the other meant something different. Finally when we found that both of us had been talking about the same thing, the whole story worked out in this way. The *Empoasca* deposits egg under the surface of the bark which is ruptured when the larva emerges. This rupture increases in size with

the growth of the tree and forms a brown incrusted area the under surface of which is then invaded by the Phytoptid mites, and these eat away the tissues underneath the bark and in that way separate the bark and cause the spreading of these brown incrustations which are not therefore really produced by the *Empoasca*. In that way the whole story was brought together.

It is most interesting to find that Prof. Brittain has discovered it in Nova Scotia. There is a very great deal to be learnt regarding these various forms of mites.

Prof. Brittain: The mark caused by the mites has a very much more metallic appearance. The lustre is more metallic, while the other has a softer gloss.

The President: They hibernate under that incrustation in enormous numbers.

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## CHERRY FRUIT FLIES.

L. Caesar, O. A. C., Guelph.

In 1910 as the result of a complaint about insects attacking a cherry orchard at St. Catharines, I found that the pest was *Rhagoletis cingulata*. In 1912, when examining another orchard near by *R. fausta* was discovered.

1. *R. fausta* has a black abdomen. *R. cingulata* has white cross bars on the abdomen.

2. The markings on the wings are quite different.

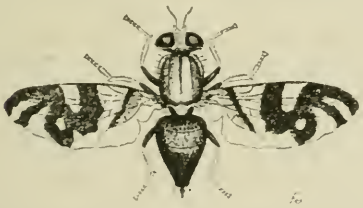

Fig. 22.—A female Black-bodied Cherry Fruit-fly (*Rhagoletis fausta.*) Note the arrangement of the dark markings on the wings, and also the black abdomen without white crossbands.

Fig. 23.—A female White-banded Cherry Fruit-fly (*Rhagoletis cingulata.*) Note the arrangement of the dark markings on the wings, and the presence of white crossbands on the abdomen.

### Distribution of the Flies.

*R. cingulata* in Canada has apparently been reported only from Ontario. In Ontario it is found in a number of orchards and gardens from Oakville to Niagara Falls, a distance of about 75 miles. Either it or *fausta* occurs at Cobourg and probably at Berlin. *R. fausta* has practically the same range in Ontario fruit districts, but has also been found in British Columbia and on one occason in North Ontario at Kearney. It has not been reported from any other part of Canada and is very scarce in British Columbia.

*R. cingulata* is on the whole the more abundant, but there are many exceptions. Some badly infested orchards will have 99 per cent. *cingulata*, others within two miles 99 per cent. *fausta*.

### Food Plants.

Sour cherries, especially Montmorency and Morello, are the favorites, but late sweet cherries are also infested. Early Richmond (a sour variety) and early sweet cherries are only to a very small extent injured, probably because they are nearly ripe before the eggs are laid and because the flies prefer to lay eggs in green cherries or those just beginning to turn. Wild sweet cherries, offsprings of cultivated sweet varieties, are also attacked, but no other kinds of wild cherries were found with any maggots in them.

### Nature and Extent of the Injury.

The injury is caused by the larvae—little white maggots—tearing the pulp around the pit with the hooks that serve as jaws and absorbing the juice. This soon renders the interior unsightly and the cherry unfit to eat. The surface above where the feeding is done often collapses. Wormy cherries are subject to the Brown Rot disease, and then spread this to neighboring cherries. Moreover the sale of wormy fruit spoils the market for good cherries.

Many orchards in the Niagara districts are infested. In some the loss is very small, in other it is very great. About one dozen fair-sized orchards have been visited that had each from 30 to 90 per cent. of the fruit wormy. There is no doubt at all that the insects are very important and need to be combated.

The Plum Curculio larva has a distinct brown head, and a stout curved, creamy white body. The Cherry Fruit-fly larva has no head, a pair of black hooks taking the place of a head. The body is not curved and tapers strongly towards this end, the anal end being blunt. The colour varies from glossy white to light yellow in both species.

The adults of *R. fausta* begin to emerge in Niagara the first week in June, that is a few days before the early Richmond cherries have begun to show any red. *R. cingulata* adults are approximately a week later, not beginning to emerge until about the 10th or 12th. The majority of *R. fausta* came out this year between June 8th and 13th, and of *R. cingulata* between June 16th and 21st, that is a little over a week later.

The average length of life of both species is a little less than one month, possibly not more than three weeks. A few adults, however, live somewhat longer. There are more females than males, though towards the end of the season there are at least five males of *cingulata* to one female. This is not true of *fausta*, the females being in the majority even late in the season.

### Length of Time From Emergence to Egg Laying.

This is difficult to determine, but from a number of experiments was found to be somewhere between ten and fourteen days.

The eggs are laid by the sharp sting-like ovipositor just beneath the skin. They can easily be seen with a hand lens by cutting across the cherry just below the surface. Eggs of both species are white and nearly elliptical. In large cages 44 larvæ were the most obtained from any one fly, but a dissection of mature ovaries showed as many as 240 eggs either fully formed or clearly distinguishable. Others would doubtless be formed as these were being laid. It would not be surprising if one fly laid 300 eggs or more. The operation of laying requires less than thirty

seconds on an average. In one case a female laid five eggs in thirty minutes. Punctures are often made without any eggs being laid, for instance 12 punctures were found in one cherry in the orchard, but only five eggs deposited.

The eggs hatch in warm weather on an average in five days. Sometimes only four days are required, but in colder weather this is not infrequently increased to eight days.

### Number of Larvæ in a Cherry and Length of the Larval Stage.

It is claimed that there is only one larva to a cherry, but we found as high as four in one instance, three in several others, and two in many cases. One is, however, the usual number.

The larval stage varies with the rate of the ripening of the fruit after the egg hatches. In July it is about 13 or 14 days on an average. In colder weather it may be three weeks.

In most cases the larvæ, when they are half grown or more, make one or sometimes two little holes in the skin of the fruit. These are supposed to be for breathing purposes.

### Pupation.

As soon as they are full grown the larvæ come out of the ripe fruit, drop to the ground and at once seek to enter it. Having done this they contract the anterior and posterior segments to form the puparia, and after the lapse of some time change to the pupæ inside these.

The usual depth is about one inch where the soil is soft and well cultivated, but in cracks in hard soil they go several inches deep. Sometimes in hard soil, covered with grass, puparia are to be found almost on the surface in among the roots and protected by these from the sun.

The puparia of *fausta* are whitish or cream colored: those of *cingulata* brown. This may not be true just at first, but is after the lapse of some weeks.

It has been proved in Ontario as well as in New Hampshire that the Apple Maggot may remain through two winters in the pupal stage before emerging. We have not had an opportunity to test this with the Fruit Flies, but observed that some pupæ, which did not emerge in the summer, were still healthy in the autumn. This suggests that it is possible a few do remain in this stage two seasons.

### Natural Means of Control.

1. Ants destroy many freshly emerged adults before their wings can become developed. They also capture many larvæ after they leave the fruit and before they can enter the soil.

2. Spiders capture a number of adults.

3. Birds, including poultry, feed on pupæ and larvæ on or in the ground.

4. Numerous larvæ, where the surface is hard, fail to enter the surface and die from exposure to heat or fall a prey to ants or other predaceous foes. Pupæ must have protection from sun and dry atmosphere.

### Control by Spraying.

The flies can easily be controlled by two applications of a sweetened poison on the fruit and foliage. The first should be made as soon as the earliest adults are seen, which in Niagara is the first week in June, or about a week before the early

Richmonds begin to show any red; the second about 10 or 12 days later. The mixture we used was 2½ to 3 lbs. arsenate of lead to 40 gallons of water, sweetened with nearly one gallon of molasses (black strap). The nozzle on the spray rod was moderately coarse, and care was taken to cover the underside of nearly all the leaves as well as the upper side. We believe in spraying fairly well so that very few leaves are missed, but not in drenching the trees. It takes very little time to cover 100 large trees which are close together. The total cost for the mixture, labour and all, is about five cents per tree.

It was found that, owing to rains, one application was not sufficient in the ordinary season, though it lessened the percentage of wormy fruit greatly.

Arsenate of lead will, without the molasses, control the pests, but it is advisable to use the molasses, because the flies are very fond of sweet substances. If the treatment is repeated two years in succession, it should free the orchard for many years, provided there is no nearby infested orchard. Useless cherry trees should be cut down and burned. Neighbors should also be asked to co-operate.

### Tests with Sweetened Poisons and with Arsenate of Lead Alone.

In 1913 an orchard of 183 trees was sprayed twice, June 13th and 23rd, with 3 lbs. arsenate of lead to 40 gals. of water, sweetened with 1 gal. molasses. This orchard had been so badly infested the previous year that much of the fruit could not be picked. Numerous flies emerged in 1913. In one cage, 4 x 1½ ft., a total of 38 flies emerged from the ground, showing that the infestation was abundant. From six trees 175 were captured in between two and three hours by Mr. Spencer and myself.

*Result.*—In a little more than a week from the second application very few flies could be seen, and at picking time a crop of $1,000 in value was harvested without either the pickers or ourselves finding a single wormy cherry, though an orchard less than quarter of a mile away under the same kind of cultivation was so badly infested that less than half the crop was harvested. The variety was Montmorency.

A second orchard on the same farm, consisting of 91 sour cherries planted among plums, peaches and early sweet cherries, had the east half sprayed, the west not sprayed.

*Results.*—Unsprayed, 10 to 40 per cent. wormy; sprayed, 1 to 13 per cent. wormy. It was clear that the flies flew about from tree to tree to a greater extent than was usually supposed.

In 1914 one orchard of 140 late sour cherries was sprayed on June 8th and June 23rd with the same mixture as above. This orchard had been very badly infested by *R. fausta* the previous year, and scarcely any cherries picked. It had been well cultivated. Numerous flies emerged and pupæ were easy to obtain.

*Results.*—The flies were very scarce in about 10 days after the first application, and never became abundant for any length of time. In a sheet spread on June 10th under one tree 70 dead flies were captured, most of them in the first 8 days, June 11th to 18th. At the time of picking none of the pickers found any wormy fruit, nor did my assistant. The owner's wife found a very occasional worm when storing the fruit, but so rare that one could not easily state it in terms of per-centum. A few unsprayed trees several hundred yards away had 75 per cent. wormy.

A second orchard of 180 trees, chiefly Montmorency, received two applications, the first on June 13th, with the same sweetened poison, and the second on June

20th, with arsenate of lead alone, 3 lbs. to 40 gals. of water. This was so badly infested that cages on the ground indicated that nearly 700 adults emerged to a tree in parts of the orchard.

*Results.*—The flies were never seen copulating or egg laying, and at picking time the Montmorencies were entirely free from worms. May Duke and Morello had much less than one per cent. wormy fruit on the worst infested trees. It is believed the flies that laid these flew in from a few badly infested trees about 200 yards away.

Check orchards not any worse infested the previous year showed 30 to 95 per cent. of wormy fruit.

### Important Points to Remember.

1. The spray must be put on early enough to kill the flies before they are old enough to lay eggs. They begin to lay in about 10 days, therefore great promptness is necessary.
2. All those who tried to control the pest with one application where it had been bad the previous year failed, hence two are necessary.
3. Cultivation is useless as a means of control.
4. Useless cherry trees should be cut down and burned.
5. The co-operation of neighbors should, where possible, be secured.

The President: I am very pleased that Mr. Caesar gave us this account of the conclusion of the work on the fruit flies, of which we have had interesting accounts from year to year. He did not mention anything about the distribution of the fruit fly elsewhere.

Prof. Caesar: I wrote to British Columbia a year ago, and they have no report now of any orchard in which either of these species is present. The black-bodied species was originally discovered in British Columbia. Mr. Good, who has been in Nova Scotia and is now working with Prof. Brittain, says that he has seen none in that province.

Prof. Brittain: A Mr. Chesley Allan sends a report and says that he has found a cherry fruit fly, but they would not let him have it. I told him that the next time I went down I would look it up.

The President: It would be likely to occur there on account of the large number of cherries grown there. I am almost sure that it occurs in Quebec. There is a dipterous larva which affects cherries down there. I should like to ask you by what means you differentiate the different larvae?

Prof. Caesar: The larvæ may be separated by the little hooks. Mr. Spencer has worked on this a good deal and he finds that on the concave surface, the under surface, there is a little projection or lobe in one species not found on the other. There are apparently some other very minute differences in the structure of the cephalopharyngeal skeleton.

The President: Did he compare the characters of the anal spiracles?

Prof. Caesar: Yes, but they do not help. It is very hard to distinguish the larvae, no matter how carefully you examine them, even under microscope.

The President: You said that the adults lived up to about a month; how did you keep them?

Prof. Caesar: We enclosed whole trees in cages.

The President: Did you try to keep the adults in tubes?

Prof. Caesar: Yes, but it was not satisfactory. A very hot day hastens their death. We could not get ideal conditions.

The President: My experience with Muscid flies in keeping them alive is strange. You would expect that the larger the cage the longer you could keep them alive.

Prof. Caesar: That was the case with the Cherry Fruit-flies in our experience, small cages were very unsatisfactory. Our cages enclosed the whole tree.

The President: The converse was true in my experience. I found that in the case of such flies as *Stomoxys* the way to keep them alive longest is to keep them in glass tubes, 6 to 8 inches long, with absorbent wool stoppers.

Prof. Caesar: I might add that we watered these cages every day that there was no rain.

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## THE CONTROL OF FOREST AND SHADE TREE INSECTS OF THE FARM.

J. M. Swaine, Assistant Entomologist for Forest Insects, Ottawa.

The beauty and comfort of any farm home depend to a not inconsiderable degree upon the shade trees which surround it; and yet we see many farmhouses, even in Eastern Canada, quite without shade trees of any kind. Such places are usually unbearably hot in summer, and unspeakably dreary in winter. A few fine shade trees would make a wonderful change. It is, however, rather with the preservation of the trees that occur that this society has to do. The most serious enemies of shade trees in this country are certain insect and fungous pests and heavy wind or sleet storms. The injuries from these sources are closely related. In many cases parasitic fungi, the cause of wood decay, gain entrance to the wood through tunnels of boring insects; fungus-injured branches and trunks provide breeding grounds for many insects; and insects, and particularly parasitic fungi, enter through storm-injured branches and wounds in the trunk.

It is possible to control most insect and fungus outbreaks on trees which are valuable enough to warrant individual treatment; but very many of these injuries could be prevented by proper handling of the trees, and considerable expense and trouble could thus be avoided.

Mistakes are made often in selecting the trees for planting. Good stock should be chosen of varieties which are suited to the climate and soil conditions of the location. Trees which are likely to succumb to local insect pests should be avoided. It is almost useless, for instance, to plant the imported cut-leaf birches in districts where the Bronze Birch Borer is abundant, or the black locust tree in regions infested by the Locust Borer.

The trees should be planted carefully and properly. Unless used for hedges, wind-breaks or close clumps, the individual trees should have sufficient room to develop the normal shape.

A good fertilizer should be applied when it is needed, and an abundance of water should be furnished to the roots in dry seasons. The weaker, unthrifty trees should receive special attention. Numbers of our bark-boring and wood-boring insects, which normally breed in dying trees, will attack trees in an unhealthy condition, particularly when the insects are present in great numbers. Other

species which are notoriously destructive to healthy trees prefer weakened bark and wood, and attack it most readily; this is true, particularly, of numbers of bark-beetle species. Vigorous trees in full sap are much better able to withstand the attack of some of these destructive borers, and are of course more likely to recover from attacks by defoliating or sucking insects, or from injuries of any sort.

We have numbers of inquiries each season with regard to dying branches of conifers. When these trees are grown in a close stand they normally lose the lower branches as the dense growth of the crowns above gradually cuts off the supply of light. This is certain to occur if the trees are close together, and does not indicate an unhealthy condition. It is possible to retain the beautiful conical shape of the spruce, for example, only when the light has free access to all parts of the tree. Spruces are commonly seriously affected by gall aphids, and often lose many branches from this cause. It frequently happens, however, that several branches will die in a season on apparently healthy isolated spruces. The needles turn yellow during midsummer and drop; small portions or entire branches may be affected. There is no insect and apparently no fungus injury, and the trees otherwise appear to be quite healthy. This trouble appears to be more in evidence during dry seasons, and it is probably due to lack of sufficient moisture.

Protection from injuries, and the proper treatment of those received, are of the utmost importance. Whenever the bark is broken and left untreated, insects and fungi are almost certain to gain entrance. Many of the most serious injuries from decay originate from neglected wounds through which the parasitic fungus enters. All such wounds should be properly cared for. The broken branches and those to be pruned should be cut off even with the trunk; wounds on the trunk or limbs should be trimmed smooth; and all such cut surfaces should be disinfected with creosote or bichloride of mercury solution and coated with coal-tar or good paint. Any needed pruning is best done during the dormant period of the trees, while the sap-flow is not sufficient to break through the coating on the wounds. Injury from wind and sleet storms can be lessened by chaining or bolting weaker upright branches together or to the trunk. Reasonable care in the prevention of injuries, and in the proper treatment of those which occur, will prevent much trouble from insects and fungous rots. Trees which have been badly injured by decay can be saved in many cases by proper surgical treatment. The decayed portions should be entirely removed and the healthy surface thus laid bare, disinfected with creosote or a solution of bichloride of mercury, and then painted with coal-tar or good paint. The parts should then be bolted together, if such support is required, and the cavity filled with cement. It is best to have any important work of this kind done by an expert in tree surgery, if such services are available.

*Clean Culture.—All dying and dead branches and trees should be removed and burned.* Many insects and rot-causing fungi breed in such material and emerge therefrom to attack weakened or even healthy trees or branches *It is of the utmost importance to cut out or collect all such material promptly and burn it so as to destroy the pests which it contains.* Make it a rule to remove and burn dying wood as soon as it is detected, and each fall or winter remove all dying and dead trees and parts and burn them before spring, so as to destroy the pests which they contain.

## General Methods of Control.

The chief injurious insects included here may be grouped as defoliating insects, sucking insects, and borers in the bark and wood.

Most leaf-eating insects may be controlled readily enough by the ordinary poison sprays of paris green or lead arsenate. Very strong mixtures are at times required, and it is sometimes advisable to employ a spray of strong contact insecticide as a more rapid control for hordes of caterpillars. Very young Tent Caterpillars, where in immense numbers, are best controlled in this way.

Sucking insects are controlled by spraying with strong contact insecticides, such as kerosene emulsion, fish-oil soap, and good tobacco extracts.

The spraying of shade-trees requires the insecticides and, in general, the methods employed in the spraying of orchard trees; except that we have to reach greater heights, and in such cases need a more powerful apparatus. For spraying the lower foliage the ordinary nozzles and equipment are used; but to reach the top of the higher trees it is necessary to employ a solid stream and a power-sprayer of large capacity. A few of the power spray-pumps sold for orchard work will maintain a solid stream for 60 feet from the nozzle; other pumps, excellent for general work in the orchard, have a small pump capacity, and are unable to maintain a solid stream above 40 ft. By using a good "solid stream" nozzle, such as the Worthley, and elevating the nozzle on a platform or ladder, the average orchard power-sprayer can be made fairly effective for shade-tree work. For towns and cities where large numbers of tall trees are to be sprayed a special power-sprayer for shade-tree purposes should be obtained. Such pumps are now available, capable of maintaining a solid stream from 80 to 100 feet up from the nozzle.

Spraying for shade-tree insects should be thorough. A mist spray at high pressure should be employed for as high as the extension will reach; and for the higher portions the solid stream is necessary. The latter uses the spray mixtures very rapidly and should be employed with discretion. It is, of course, quite necessary to understand the habits of the insects to be controlled and to make the sprays at the proper time.

*Hand-picking* is effective to a very limited extent. The tents of the American Tent Caterpillar can be removed by means of tree-trimmers or torches; egg-masses of the tent-caterpillars and the tussock moths can be removed by hand at times with profit; and the larger caterpillars, which rarely occur in great numbers, can sometimes be removed from low foliage by hand more cheaply and effectively than in any other way.

*The Destruction of Larger Borers*: When living trees become infested with large boring grubs or caterpillars it is necessary to kill the borers within the wood with the least possible injury to the trees. When the borers are near the surface it is often possible to cut them out with a knife or chisel without much injury to the wood; or a wire thrust into the borings can sometimes be used effectively. It is usually possible to kill the grubs by injecting carbon bisulphide or benzine into the openings. The fluid should be injected with a syringe or oiling can, and the opening should be immediately closed with soap or putty. After several hours the plug should be removed and the grubs extracted if easily reached, decaying wood cut away, and the holes thoroughly syringed with strong lime sulphur or copper sulphate, or with a solution of bichloride of mercury, and finally filled with cement or putty. The fluid should be injected into the flatter holes from which sap and borings have been oozing, and which evidently lead to the tunnels of living larvæ.

It is useless to inject insecticides into the exit-holes, from which the adults have escaped, although such holes should be disinfected and filled with putty or cement.

*Banding* the trunks of deciduous trees to prevent infestation from wandering hordes of tent-caterpillars or the wingless females of the canker-worms is often a necessary precaution. The most effective method is to make a complete girdle about the trunk with a sticky substance over which the insects cannot crawl. The adhesive should be applied in a band about four inches wide to stout paper tacked or tied about the trunk five or six feet from the ground. If the bark is uneven cotton should be placed beneath the paper to prevent the insects passing beneath. One of the best adhesives for banding is made by boiling resin and castor oil in equal parts and thoroughly mixing. The well-known preparation "Tree-tangle-foot" is widely used for this purpose.

### Danger of Insect Importations.

The shade trees of the Eastern States are infested by several very destructive insect species which have not yet become established in Canada. The Brown-tail Moth has unfortunately gained a foothold in Nova Scotia and New Brunswick, but is being successfully held in check. Flights of the moths from infested districts in Maine have been responsible for the infestations. The Gipsy Moth spreads much more slowly, and is not yet known to be breeding in any part of Canada.

The Elm Leaf Beetle, *Galerucella luteola* Muller, is a most deadly enemy of the elms throughout many parts of the Eastern States. It has not yet been reported as injurious in Canada; it occurs, however, throughout the northern and western part of New York State and the country adjacent to Lake Ontario, and we may expect it in the Niagara Peninsula before many years.

The adult beetle is about one-fourth of an inch long, reddish-yellow or greenish-yellow in colour, with three black spots on the prothorax, and usually three black stripes lengthwise on the wing-covers. The adult beetles eat irregular holes in the leaves, and the grubs eat away the under surface of the leaves, which rapidly dry and turn brown. This species has killed great numbers of elm trees throughout its range. It can be controlled by poison sprays; but would, without doubt, create havoc if it were to become established in Ontario or Quebec.

In recent years the elms about Boston have been attacked by the Elm Bark-beetle, *Eccoptogaster multistriata* Marsh. This small species is a most important enemy of weakened or unthrifty trees. The adults are black and about 1-8 inch in length, with a short snout. They are easily distinguished from the common, and less injurious elm snout-beetles, which are very distinctly larger and have a long, slender snout or proboscis. The adults of the Elm Bark-beetle bore round holes through the bark and cut egg-tunnels along the surface of the wood. From the eggs, laid along the sides of these egg-tunnels, the larvæ or grubs hatch and excavate individual galleries away from the egg-tunnels through the inner bark. After pupating in the ends of these larva mines, and transforming to adults, they cut small round holes thorugh the bark to freedom. A discovery of these small black beetles with their whitish grubs beneath the bark of dying elms should receive immediate attention.

The Hickory Bark-beetle, *Eccoptogaster quadrispinosus*, a much larger species of the same genus and with similar habits, is a destructive enemy of hickory trees as far north as Lake Erie. It has not been recorded as injurious in Eastern Canada; but I have specimens taken in Southern Ontario, and we may find any summer that it has obtained a foot-hold in the Niagara Peninsula.

The Leopard Moth, *Zeuzera pyrina* Linné is another very destructive enemy of deciduous shade-trees which may eventually spread northwards. Its large caterpillar excavates tunnels in the wood, and has become a very serious pest throughout the region between New York and Boston.

All these species, with the exception of the Hickory Bark Beetle, were imported from Europe in various ways and at different times. It is quite possible that some definite minimum temperature will determine the northern limit of their range; but it is probable that most of them will breed readily enough in Southern Ontario. It is well, therefore, to be familiar with the appearance and habits of such possible enemies, for the successful eradication of an infestation could only be accomplished at the very inception of an outbreak.

### The Injurious Insects of the Woodlot.

We have been dealing thus far with the shade-trees or ornamental trees of sufficient value to the owner to warrant individual treatment.

It is quite another matter to control the insect enemies of woodlands, chiefly for the reason that we have here so many trees to deal with that individual treatment, such as spraying, usually involves an unreasonable expense. The insects involved will be those which affect indigenous shade-trees, and they may be controlled by the same methods, limited always by the factor of expense. It might, for instance, be worth while to control a serious outbreak of defoliating insects in a valuable sugar bush by banding or even by spraying the trees, having in mind the serious effect of successive defoliations upon the vitality of the trees, but such work throughout a large strip of ordinary bush land would be quite out of the question.

We must depend chiefly upon "clean culture" for the control of insect and fungous pests in woodlots. A proper system of handling the trees, by which wounds of all kinds are largely prevented and the trees are given a fair opportunity for healthy growth, would help to reduce the injuries from insects and fungi. Injuries from fire or from falling trees should be carefully avoided. Fire-injured trees are particularly liable to insect attack, and wounds on the trunk and larger branches almost invariably become infected by parasitic fungi, as well as by various insect foes.

Boring-insects of many kinds breed largely in dying and recently dead trees and their parts, and spread from such material to nearby weakened trees and branches, or even attack perfectly sound timber. The dying branches and trees so common in most woodlots are largely caused by boring-insects and rot-causing fungi. The control of such pests consists in removing all injured, dying and dead wood and shelf-fungi during winter and burning it, as firewood or otherwise, before spring opens, so that the contained pests are destroyed before they can spread to the living trees. All slash from cuttings should be burned during winter or early spring. If green slash is left through the spring it serves as a trap for many boring insects, which may then be destroyed by burning the piles towards the end of June, but fire danger, of course, must be considered first. The stumps should be cut low and barked. Logs which must be left in the woods during the months of June and July can be preserved from borers by barking before the last of May. All trees which are badly injured or dying should come out, to give place for others and to remove breeding grounds for insects.

Healthy trees are less subject to attack by most insects and fungi, and conditions which produce a thrifty tree growth aid greatly in preventing such injuries.

## VARIATION IN THE COLOUR OF THE BRISTLES OF THE HEDGEHOG CATERPILLAR, *ISIA ISABELLA* S. and A.

ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT OF AGRICULTURE, OTTAWA.

For some years the writer has been interested in the remarkable variation in the colour of the larval bristles of the arctian, *Isia isabella* S. and A., and an endeavour has been made to obtain a series of the mature larvæ in colours, ranging from wholly red to wholly black. This series is not as yet quite complete, but it is, I think, of sufficient interest to present at this meeting. As almost everyone knows, in most specimens the colour of the bristles from the central segments is a rust-red, the remaining bristles being black. For some time I have had specimens in which the red bristles predominated, and one example in which almost all of the bristles were rust-red, but it was not until the spring of 1914 that a larva almost wholly black was obtained. This latter specimen was received from British Columbia, along with examples of the more ordinary type. The larvæ were unusually abundant in that province and attracted considerable attention, owing to their well known habit of wandering about in spring preparatory to pupation.

A study of the colour of the bristles of the specimens shown herewith, indicates as follows:—

*Specimen No. 1.*—This example has nearly all of the bristles from the tubercles of a bright rust-red, the exceptions being a few black bristles from the lateral tubercles on segments 2, 3 and 4, and a few from dorsal tubercles on segment 2.

*Specimen No. 2.*—The bristles on this specimen are rust-red from all segments excepting those on segments 4 and 5, and a few from segments 2 and 3, which are black.

*Specimen No. 3.*—From segments other than 3, 4 and 5, and a few from dorsum of segment 12, the bristles are rust-red.

*Specimen No. 4.*—The black bristles on this larva are from segments 3 and 4, and on dorsum of segments 12 and 13, and a few from lateral tubercles on anal segment: the others rust-red.

*Specimen No. 5.*—Bristles black from segments 2, 3, 4, 5, 12, 13 and from tubercle I on segment 6; other bristles rust-red.

*Specimen No. 6.*—This specimen shows additional black bristles on segment 6, namely, from all the tubercles excepting II.

*Specimen No. 7.*—Bristles from segments 2, 3, 4 and 5 wholly black, from segment 6 mostly black, few rust-red bristles from tubercles II and III, and about half of this colour from tubercle IV. The bristles on the dorsum of segment 11, from tubercles I, II and III, and all from segments 12 and 13 are also black.

*Specimen No. 8.*—This larva differs from No. 7 in having all the bristles on segment 6 black, and only rust-red bristles from tubercles VI, VII and VIII on segment 11.

*Specimen No. 9.*—From all tubercles on segments 2, 3, 4, 5, 6, 12 and 13 the bristles are black; the others rust-red.

*Specimen No. 10.*—In this larva the black bristles are from the same segments as is the case with No. 9, but in addition all the bristles from tubercle I on segment 7, and from tubercles I, II and III on segment 11 are also black.

*Specimen No. 11.*—The only rust-red bristles on this specimen are from segments 8 and 9.

*Specimen No. 12.*—Almost wholly black, only a few very dark reddish-brown bristles from lateral tubercles, particularly on central segments.

## HENRY HERBERT LYMAN, M.A.

The appalling calamity that befell the steamship "Empress of Ireland," in the River St. Lawrence, near Father Point, shortly after midnight on Friday, May 29th, was acutely brought home to the older members of the Entomological Society of Ontario by the sad tidings that Mr. H. H. Lyman and his wife were among the thousand and more who were lost. For some few days we hoped against hope, but no traces of them have been found and there is not a vestige to show in what manner death came upon them; it seems most probable that they were drowned in their stateroom before they had time to escape. Mr. Lyman was to have sailed a fortnight earlier, but owing to the pressure of business matters he postponed his departure, with so sad a result.

Mr. Lyman was born in Montreal on the 21st of December, 1854, and received his early education at the High School and West End Academy. At McGill University he took the Arts Course and proceeded to the degree of B.A. in 1876, winning the Logan Medal in Geology and Natural Science, and received his M.A. degree in 1880. On completing his college career he entered his father's firm, Lymans, Clare & Co., wholesale chemists and druggists in Montreal; in 1885 he became a partner in the business, whose name has been changed to Lyman, Sons & Co. On the death of his father he became senior partner and president of Lymans, Limited, which includes the branch house in Toronto. His position in these important concerns manifests his remarkable business capacity and the attention he must have paid to their affairs. The houses are widely known throughout Canada, and bear the highest reputation for upright dealing, energy, and enterprise.

Though much engrossed with the management of a very large business establishment which demanded a close attention to innumerable details, Mr. Lyman found time for an active interest in many other things. In 1877 he joined the 5th Battalion of the Canadian Volunteer Force (now the Royal Scots of Canada) and rose from ensign to major in 1885, retiring with that rank in 1891. He was a life governor of the Montreal General Hospital; treasurer and vice-president of the Graduates Society of McGill University; fellow of the Royal Geographical Society and of the Royal Colonial Institute; one of the organizers of the Imperial Federation League in Canada, and a member of the deputation which waited upon Lord Salisbury's administration in 1886, asking that an Imperial Conference representing the whole British Empire should be summoned; the conference was held during the following year; he was also a director of the British and Colonial Press Service. Though little interested in local politics he was an ardent Imperialist, and considered that the perpetual unity of the Empire far surpassed in importance all other political questions; he advocated Imperial preferential trade and believed that Canada should bear its share of the burden of Imperial defence.

To turn to a different aspect of his life, the one in which our readers are more interested—we learn that when only eight years of age he began to observe insects and their ways, and when a boy of twelve commenced to form a collection of Lepidoptera, which has now become one of the finest and most extensive in Canada. On January 5th, 1875, Mr. Lyman became a member of the Entomological Society of Ontario by joining the Montreal branch. At the following meeting he exhibited a case of butterflies from Illinois, following a custom which has always been characteristic of the Montreal meetings. These exhibits usually led to discussions in which Mr. Lyman took an active part and spared no pains

in arriving at correct conclusions, studying the original descriptions, and at times taking the specimens to the United States or the British Museum for final determination. He would never jump at conclusions, but, sparing no time or trouble, would not rest satisfied till certainty was assured.

His first paper was presented at the meeting on October 5th, 1875, being a description of the larva and pupa of *Grapta interrogationis*; this was followed a few months later by a list of Diurnal Lepidoptera taken at Portland, Maine (published in the Can. Ent. XII., 7-9). For nearly ten years he spent his annual summer holiday on the Atlantic coast, where he added largely to his collections and developed his love for the butterflies, which he took great delight in rearing through all their stages. The first article from Mr. Lyman's pen which appeared in the Canadian Entomologist (Volume VI., page 38) is in the form of a letter asking question about several butterflies found at Portland, Maine. In the same volume (page 158) he described the curiously marked egg of *Gastropacha americana*. From the 19th to the 44th volume, none have been without at least one article from his pen, and he lately expressed his regret that he failed to contribute last year to Vol. XLIV. In addition to his articles in this magazine, he wrote several of a more popular character for the Annual Reports of our society, and contributed a few also to "Entomological News." A list of his more important papers is given below.

The third annual meeting of the Montreal branch was held at Mr. Lyman's residence on May 7th, 1876, at which the minute book records that "he exhibited his fine collection of local and exotic insects." This was the beginning of a long series of gatherings under his hospitable roof; during thirty-seven years a large proportion of the monthly meetings were held there, and were thoroughly enjoyed by the members and occasional visitors from a distance. They were made especially interesting at times by his delightful accounts of visits to scientific gatherings in the United States and Europe as well as in Canada; he would recount the proceedings often with a good deal of humour, and tell of the eminent men whom he met. In the course of years he gathered together a large collection of books on the Lepidoptera of North America chiefly, and these he was always most kind in lending to his fellow members when they required to consult them.

While interested in everything connected with the Lepidoptera of this continent, he paid little attention to the "Micros," but was always keen to acquire specimens for study and comparison of such genera as Colias, Argynnis, Grapta, Chionobas, Haploa, Hyphantria, Papaipema, Xylina and Hepialus. His papers on these subjects will always be found of value and interest.

On June 5th, 1877, he was elected Vice-President of the Montreal branch, and four years later he became President, holding the higher office for two years; in 1888 he again became President, and retained the position till 1899.

In 1895 he was elected Vice-President of the parent society, and in 1897 became President, holding the highest place in the society for the usual term of two years, to the great satisfaction of the members. He rarely missed one of our annual meetings, and as a permanent director of the society took an active part in the management of its affairs. His interests, however, were not confined to his native land. Many years ago he joined the American Association for the Advancement of Science and was recently much gratified at being elected a Fellow: he used to say that an amateur who did good work was really more deserving of honour and recognition than a professional entomologist, who received pay for his work. He was also a Fellow of the Entomological Society of America and of the

Entomological Society of London, England; an honorary member of the New York Entomological Society and the Cambridge Entomological Club; for some time he was Vice-President of the Natural History Society of Montreal. His last official act was the reading of his report as delegate from our society to the Royal Society at the meeting in Montreal on Wednesday, May 27th, the day before he started on his fatal voyage.

For a long time past Mr. Lyman's friends had been much distressed by his increasing deafness, which of late had almost become total. Conversation with him could only be carried on with the aid of an ear-trumpet or by writing. In spite of this severe disability, he was always bright and cheerful, full of innocent fun and enjoying a harmless joke. He travelled about a great deal, attending scientific meetings and other gatherings, among others the International Congresses of Entomology at Brussels and Oxford, which he seemed to enjoy, though latterly he could not hear a word of the papers and discussions. The writer and many friends were greatly pleased as well as surprised when he informed us that he was about to be married. Since the death of his mother, to whom he paid devoted attention during a long period of weakness and infirmity, he had been living a somewhat lonely life. Two years ago, in March, 1912, he was married to the daughter of the Rev. William Kirkby, of New York, formerly rector of Collingwood, Ontario. She attended, with her husband, the Jubilee meeting of our society at Guelph last August, and charmed all who had the pleasure of spending any time in her company. It seems inexpressibly sad that our two friends should have had so short a period of happy married life, and have ended their days together in a tragedy so sudden and so awful.

### Mr. Lyman's Published Papers.

To the Canadian Entomologist he contributed sixty articles, among which the following may be mentioned:—

Notes on Colias Christina, Vol. XVI., 5.

The North American Callimorphas, Vols. XIX., 181 with plate, and XXI., 231.

Can Insects Survive Freezing? Vols. XXIV., 1, and XXX., 287.

Pamphila Manitoba and Its Varieties, XXIV., 57.

Prep. Stages of Nemeophila Scudderi, XXV., 248.

Occurrence of Hepialus Thule at Montreal, XXV., 297, and XXXIX., 397.

The Larger Species of Argynnis and the Mystery of Their Life History, XXVIII., 143.

Prep. Stages of Erebia Epipsodea, XXVIII., 274.

Life History of Colias Interior, XXIX., 249.

Life History of Xylina Bethunei, XXXIII., 1.

What is a Genus? XXXIV., 187.

New Gortynas, XXXVII., 305 (with plate).

A North American Entomologists' Union, XXXVIII., 1.

Type and Typical, XL., 141.

Recent Work Among the Borers, XL., 249.

Notes on N. A. Graptas in the British Museum, XLIII., 418.

The second International Congress of Entomology, XLIV., 370.

*In the Annual Reports:*

No. 23, p. 32, A Trip to Mt. Washington.

No. 32, p. 57, Fall Web-worms, with plate of 33 figures.
No. 32, p. 61, Notes on Danais Archippus.
No. 37, p. 39, A Hunt for a Borer.
No. 39, p. 145 Life History of Euchetias Oregonensis.
No. 40, p. 46, Origin and Diffusion of Entomological Errors .

In 29th Report, p. 17, President's Annual Address, delivered on the occasion of the 25th anniversary of the Montreal Branch.

In Entomological News, Vol. XVIII., p. 420, is an able article on *Thecla calanus* and *T. edwardsii* (with the footnote that it was read before the Ent. Soc. of Ontario at Guelph, July 4, 1907).

In Vol. VII., 172, On Occurrence of *Chionobas tarpeia* in North America.

Several short items also appear, including one regarding *Erebia discoidalis* in the first volume, p. 116.

C. J. S. B.

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## DR. WILLIAM SAUNDERS, C.M.G.

On Sunday afternoon, September 13th, after an illness which had continued for nearly two years, and which for a twelvemonth had rendered him mentally incapable, Dr. William Saunders passed to his rest at his home in London, Ontario, in the seventy-ninth year of his age. He was born in Devonshire, England, and came to Canada with his parents when a boy of twelve. His educational advantages were meagre, but he succeeded in obtaining a technical training in chemistry and set up in business as a retail druggist in London. His agreeable manners, thorough honesty, and untiring industry brought him a fair measure of success. His love of nature led him to the collection of wild plants and insects, which could be found in abundance in the neighbourhood, and he became an ardent student of botany and entomology. Finding many medicinal plants readily obtainable, he began the preparation of fluid extracts, which were so pure and reliable that they soon became widely and favourably known among the medical profession, and led by degrees to the establishment of an extensive and lucrative business, both wholesale and retail. Years later, when he became Director of the Experimental Farms of the Dominion, the wholesale business was transferred to his eldest son, Mr. W. E. Saunders, by whom it is still successfully maintained, and the retail department to two of his younger sons, who, however, afterwards relinquished it for other pursuits.

During the five-and-twenty years of his business life, Mr. Saunders found time for taking an active part in many other things. Besides his scientific work in entomology and botany, he took a great interest in fruit-growing, establishing a farm of his own near the city, and becoming a zealous member of the Ontario Fruit Growers' Association, of which he was a director for many years and president from 1882 to 1885. In connection with his professional work he was appointed Professor of Materia Medica in the Western University, Public Analyst for Western Ontario, and President for two years of the Ontario College of Pharmacy, of which he was one of the founders. He was an active member of the American Pharmaceutical Society, and Fellow of the American Association for the Advancement of Science. His attendance at the meetings of these societies, held from year to year in various cities of North America, caused him to have a widely extended friendship with notable men of all kinds, by whom he was highly esteemed and respected.

The writer's acquaintance with Dr. Saunders began more than fifty years ago when we were both young men, and soon ripened into a warm friendsip, which has continued unbroken until now during all these years. In those early days, when the study of entomology was so difficult owing to the scarcity of books on the subject, we were in constant correspondence, helping each other in every way we could, and spending each summer some days together, comparing notes, studying specimens and making collecting expeditions. Many happy hours we spent together in early morning tramps to the ponds and woods about London, and in the evening, when his day's business was over, in examining the captures we had made. At that time there were few in Canada who took the least interest in the objects which to us afforded the keenest pleasure, but as time went on we found here and there a congenial spirit, and were led on in 1862 to attempt the organization of an Entomological Society. This was successfully accomplished during the following spring, and last year the completion of half a century's work and progress was celebrated by the jubilee meeting at Guelph. An account of the proceedings on that occasion and the history of the formation and growth of the society have been given in the November (1913) number of the "Canadian Entomologist" and the 44th Annual Report of the Society. In 1868 Mr. Saunders and the writer decided upon making another venture and began the publication of the "Canadian Entomologist," to the first two numbers of which we were the sole contributors. For five years the latter was the editor, and was then succeeded by Mr. Saunders, who continued the management of the magazine until his removal to Ottawa in 1886. Three years previously there was published in Philadelphia his notable book "Insects Injurious to Fruits," which is justly regarded as a classic by economic entomologists. A second edition was issued in 1892, and the author had begun the preparation of a third when his prolonged illness rendered him incapable of accomplishing any literary work. A list of his published articles, bulletins, reports, etc., fills six columns of the Bibliography in the Transactions of the Royal Society of Canada for 1894, and a large number have been added since. In 1881 he had been appointed by the Governor-General of Canada, the Marquis of Lorne, one of the original Fellows of the Royal Society, and in 1906 he was elected President, having thus risen to the highest position of honour for scientific work that can be attained in this Dominion. Twenty years ago it was said of him by an American writer that "by painstaking study and observation he had risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist."

A very important change took place in the life and work of Dr. Saunders in 1886, when he was appointed Director of the Experimental Farms of the Dominion, and left his home and business in London to reside in Ottawa. During the previous year he was commissioned by the Government to visit various Experimental Stations in the United States and to report upon agricultural and experimental work in Europe and America. In this new sphere of labour he applied himself with his wonted vigour, and in the course of a few years was mainly instrumental in bringing these establishments into thorough working order and into a high standard of excellence. Anyone who saw the Ottawa Farm in the autumn of 1886—a large tract of bare land, with workmen busily employed in levelling and removing stumps and boulders with dynamite—and then visited it ten or fifteen years later (as did the writer) could not fail to be impressed with the wonderful work accomplished by the genius of Dr. Saunders in turning a waste into a scene of beauty and a hive of industry. Here have been carried on under his direction a great variety of experiments in breeding and feeding live stock, testing soils and

water, growing fruit and ornamental trees of all kinds, selecting hardy varieties, improving the size and quality of any fruits suited to the climate of the Western Provinces, beekeeping, experiments and observations in economic entomology, plant pathology, and various other matters pertaining to the welfare and benefit of the farming community. Especially noteworthy was his work in crossing varieties of grain and producing new and improved kinds; one alone of these, the Marquis wheat, is believed to have added millions of dollars to the value of the wheat products of the prairie country. All information thus acquired has been freely afforded to the farmers by distribution of seed, and bulletins and reports on all manner of subjects.

The ever-growing work and its extension in every Province of the Dominion began at length to tell upon the physical strength of the man who was the mainspring of it all. His vitality, owing to advancing years and the inroads of an insidious disease, began to fail, and he felt that the time had come for his retirement. Accordingly he resigned about three years ago, and went with his wife and daughter for a pleasure trip to Europe—his first real holiday since he went to Ottawa. His friends expected him to return with much improved health, but it was ordered otherwise; he became very ill in England, and never entirely recovered. He had completed his life work, his duty was well done, and he has left the record of great deeds accomplished, and of vast and widespread benefits conferred upon the people of the land. This account of a remarkable man would be incomplete without a reference to his beloved wife, who was a true helpmeet both in small things and in great. Ever cheerful and encouraging, full of kindness and hospitality, perfectly unassuming and free from all affectation, she is loved and esteemed by all who know her, and her children and friends rise up and call her blessed. To her, in her desolation, and to her family in their sense of loss our sympathies go out in the fullest measure.

The ability and work of Dr. Saunders have been recognized in many gratifying ways. In 1905 he received the distinction of Companion of the Order of St. Michael and St. George, conferred by His Majesty King Edward; Honorary LL.D. from Queen's University in 1896, and from the University of Toronto in 1903: the Mantua Gold Medal for distinction in scientific knowledge. He was a fellow of the Entomological Society of London and the Royal Microscopical Society; an honorary member of the Pharmaceutical Society of Great Britain and of the Highland and Agricultural Society of Scotland, and an ordinary member of a large number of scientific societies in the United States of America.

C. J. S. B.

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## THE ENTOMOLOGICAL RECORD, 1914.

Arthur Gibson, Chief Assistant Entomologist, Department of Agriculture, Ottawa.

Every year new names of persons residing in various parts of Canada are added to the list of those who collect insects, and owing to the increased interest which is taken in the collection and study of insects, it seems desirable to again point out the chief reasons for the publication of this annual Entomological Record. As stated in an early issue of the Record, there is no object in publishing year after year long lists of insects which have been taken within their

known range, but only such data as it is thought will be of value to students of geographical entomology, and to those interested in life-histories, particularly the exact dates when the various insects occur in the perfect state. Notes on species not known to have been previously recorded from any of the provinces are specially desired. Where districts within any of the provinces have been fairly well worked over, any new additions to such local lists would be of value. Such information we have endeavoured to present from year to year, in addition to brief references to literature of interest to Canadian students.

During 1914, many interesting species were collected throughout Canada, and in the determination of certain of these and of specimens gathered in former years we have again received much help from the recognized authorities in the United States and elsewhere. Our special thanks are due to Dr. L. O. Howard and his associates at Washington—Dr. Dyar, Dr. Banks, Messrs. Schwarz, Crawford, Busck, Rohwer and Knab; Sir George F. Hampson, of the British Museum; Prof. H. F. Wickham, of Iowa City, Iowa; Mr. E. P. Van Duzee, of Department of Agriculture, University of California, Berkeley, Cal.; Dr. Henry Skinner, of Philadelphia, Pa.; Col. Thos. L. Casey, of Washington, D.C.; Mr. C. W. Johnson, of Boston, Mass.; Mr. Chas. Liebeck, of Philadelphia, Pa.; Prof. H. S. Hine, of Columbus, Ohio; Mr. Chas. W. Leng, of New York, N.Y.; Prof. J. M. Aldrich, La Fayette, Ind.; Dr. W. G. Dietz, of Hazleton, Pa.; Mr. J. R. de la Torre Bueno, of White Plains, N.Y.; Mr. F. H. Wolley-Dod, of Midnapore, Alta., and Dr. E. M. Walker, of Toronto, Ont.

## Literature.

Casey, Thos. L. Memoirs on the Coleoptera, V; published by the New Era Printing Company, Lancaster, Pa.; issued Nov. 28, 1914, pp. 387. This fifth memoir consists of: Part I, Studies in Omus and Cicindela, pp. 1-24; Part II, Some observations on the Carabidæ, including a new subfamily, pp. 25 to 44; Part III, A Revision of the Nearctic Harpalinæ, pp. 45-305; Part IV, A Review of the Genus Thyce and of the North American species of Polyphylla, pp. 306-354; Part IV, Miscellaneous Notes and New Species, pp. 355 to 376. In the memoir 333 species are described as new, seven of which are from Canada.

Crawford, David L. A contribution toward a monograph of the Homopterous insects of the Family Delphacidæ of North and South America; Proc. U. S. N. M., Vol. 46, pp. 557-640, with plates 44-49; published March 4, 1914, received 11 March. In this paper 35 species are described as new, and nine as new varieties. None of these are from Canada. Five species are recorded from the Dominion. The author states that the family Delphacidæ was until quite recently, in fact, by some, is still, considered as a subfamily of the larger group Fulgoridæ. By most students now, however, it is separated from its near relatives as a distinct family, chiefly on account of the large movable spur, or calcar, at the base of the posterior tibiæ.

Crawford, David L. A monograph of the Jumping Plant-lice or Psyllidæ of the New World, Bulletin 85, U. S. N. M., Washington, D.C., issued June 3, 1914, pp. 186, plates 30. In this important contribution, 68 species are described as new or new varieties, four of which are from Canada. In addition to these latter, Canadian records are given of 10 other species. Pages 5 to 16 are devoted to a discussion of the head, the thorax, appendages of the thorax and abdomen. Brief chapters on Locomotion, Relations to other Homoptera, Collecting and Preserving and Determinations from Immature Stages will be found

on pages 16 and 17. Then follows a systematic discussion of the species. As the title would indicate only American genera are treated in the monograph. These have been arranged in six subfamilies—Liviinæ, Pauropsyllinæ, Carsidarinæ, Ceriaereminæ, Triozinæ and Psyllinæ.

Hampson, Sir George F. (Bart.) Catalogue of the Lepidoptera Phalaenæ in the British Museum, Vol. XIII, Noctuidæ, Sept. 1913, 609 pp. plates CCXXII-CCXXXIX: received 12 Jan., 1914. The subject of this volume is the classification of the remainder of the noctuid subfamily Catocalinæ and the subfamilies Mominæ and Phytometrinæ. The Catocalinæ are represented in the volume by 41 genera and 379 species, making a total of 107 genera and 1,022 species for the subfamily. The Mominæ are represented by 11 genera and 74 species and the Phytometrinæ by 15 genera and 226 species. Records are given of 197 species from North America, six of which are described as new. 67 Canadian locality records are included. An interesting portion of the volume is the treatment of the species known under the old name of *Plusia*, also the arrangement of the species in the genus *Zale*. The excellent plates which accompany the volume are indeed beautiful and of great value.

Hewitt, C. Gordon. The House-fly, Its Structures, Habits, Development, Relation to Disease and Control: Cambridge; at the University Press, 1914: 382 pages, 3 full page coloured plates, and 104 text figures; price 15 shillings net. This is undoubtedly the most comprehensive and complete volume which has yet appeared on the house-fly. It has been prepared primarily for the use of entomologists, medical men and health officers. It is divided into six parts, viz.: Part I, The Structure and Habits of the House-fly; Part II, The Breeding Habits, Life-history and Structure of the Larva; Part III, The Natural Enemies and Parasites of the House-fly; Part IV, Other Species of Flies Frequenting Houses; Part V, The Relation of House-flies to Disease; Part VI, Control Measures.

Hewitt, C. Gordon. Bibliography of Canadian Entomology for 1912: Ottawa; Trans. Royal Soc. of Canada, Third Series—1913, Vol. VII, Section IV. References are given to 121 papers, 22 of these relate to Lepidoptera, 17 to Hymenoptera, 11 to Diptera, etc., etc. Titles of 48 papers on subjects of economic entomology are given. This annual publication indicates concisely the increasing interest which is being taken in Canadian insects.

Malloch, J. R. American Black Flies or Buffalo Gnats: U.S. Dept. Agriculture, Bureau of Entomology, Technical Series No. 26; pp. 70, plates 6: issued April 6, 1914. In this paper 15 species are described as new, three of which are from Canada. On pages 68 and 69 is given a catalogue of North and Central American Simuliidæ. Under the genus *Prosimulium*, 5 species are given; under the genus *Parasimulium*, 1 species, and under the genus *Simulium* 37 species. Of the 38 species the types of 22 are in the United States National Museum.

Morley, Claude. A Revision of the Ichneumonidæ based on the collection in the British Museum (Natural History), Parts III, Tribes Pimplides and Bassides: British Museum (Natural History) 1914, pp. 148, 1 plate (coloured): received Sept. 1, 1914. Part I appeared in 1912 and Part II in 1913. In Part III, 374 species are included, 49 of which are described as new. Records are given of 15 species from Canada, which are in the British Museum: 2 of these are described as new.

Skinner, Henry. Studies in the Genus Thanaos: Trans. Amer. Ent. Soc. XL. pp. 195-221, Aug. 3, 1914. This paper is of much interest. These butterflies have always troubled lepidopterists, but thanks to Dr. Skinner we are now able

to understand them much better. Definite records from Canada are given of five species. Two species are described as new.

Slingerland, the late Mark Vernon, and Crosby, Cyrus Richard, Manual of Fruit Insects: New York; The Macmillan Company, 1914; pp. 503; 396 illustrations; price $2.00. This much needed book was published in July, 1914, and is an excellent work of reference. Although prepared specially for fruit growers, entomologists generally will find this volume of extreme use. It is divided into 15 chapters, the titles of which are: I, General Considerations; II, Apple Insects—The Fruit; III, Apple Insects—Buds and Foliage; IV, Apple Insects—Aphis, Scales and Others; V, Apple Insects—Borers and Miscellaneous; VI, Pear and Quince Insects; VII, Plum Insects; VIII, Peach Insects; IX, Cherry Insects; X, Raspberry, Blackberry and Dewberry Insects; XI, Currant and Gooseberry Insects; XII, Strawberry Insects; XIII, Grape Insects; XIV, Cranberry Insects; XV, Insecticides. In the appearance of this book the science of entomology in Canada is indeed honoured. The following words appear on the dedication page: "To William Saunders, Leader in Agricultural Enquiry, author of 'Insects Injurious to Fruits,' which for nearly one-third of a century has been the standard work on the subject, this book is dedicated as a token of appreciation."

Somes, M. P. The Acridiidæ of Minnesota. University of Minnesota Agricultural Experiment Station, Technical Bulletin No. 141, University Farm, St. Paul, July, 1914; pp. 100, plates 4 (3 coloured). In this very useful systematic study the author states, every effort has been made to furnish data which shall apply to the forms found in Minnesota and the tables and descriptions have been rewritten and modified to fit them to local conditions. Notwithstanding, this bulletin will be found of much value to Canadian students of orthoptera. In addition to the descriptive notes, much information is given under many of the species, on habitat, flight, etc. The plates at the end of the bulletin are, in general, excellent.

Viereck, Henry L. Type species of the Genera of Ichneumon Flies; Bulletin 83, United States National Museum, Washington, D.C., issued Jan 31, 1914; pp. 186; received Feb. 13. This paper, as the author states, is an alphabetic catalogue of the genera of the Ichneumonoidea, together with the type of each genus. It is presumed to be complete up to the end of 1912. It is a most useful contribution and will be welcomed by students of hymenoptera.

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The following is a list of the names and addresses of collectors heard from during 1914:

Anderson, E. M., Provincial Museum, Victoria, B.C.
Baird, Thos., High River, Alta.
Beaulieu, G., Ent. Branch, Dept. Agr., Ottawa.
Beaulne, J. I., Ent. Branch, Dept. Agr., Ottawa.
Bethune, Rev. Prof., O.A.C., Guelph.
Blackmore, E. H., Victoria, B.C.
Brimley, J. F., Wellington, Ont.
Brittain, W., Agric. College, Truro, N.S.
Bush, A. H., 1105 Broadway, Vancouver, B.C.
Caesar, L., O.A.C., Guelph, Ont.
Chagnon, Gus., Box 521, Montreal.

Chagnon, W., St. John's, Que.
Chandler, Frank S., Kaslo, B.C.
Chrystal, R. N., Ent. Branch, Dept. Agr., Ottawa.
Cockle, J. W., Kaslo, B.C.
Cosens, Dr. A., Parkdale Collegiate Institute, Toronto.
Crew, R. J., 561 Carlaw Ave., Toronto.
Criddle, Evelyn, Aweme, Man.
Criddle, Norman, Aweme, Man.
Dawson, Horace, Hymers, Ont.
Day, G. O. Duncans, B.C.
Dod, F. H. Wolley-, Midnapore, Alta.
Emile, Rev. Bro., Longueuil, Que.
Evans, J. D., Trenton, Ont.
Fyles, Rev. Dr. T. W., 368 Frank St., Ottawa.
Germain, Rev. Bro., 125 Empress St., Ottawa.
Gibson, Arthur, Ent. Branch, Dept. Agric., Ottawa.
Hahn, Paul, 433 Indian Road, Toronto.
Haight, D. H., Sudbury, Ont.
Hanham, A. W., Duncan, B.C.
Harrington, W. H., P. O. Dept., Ottawa.
Hewitt, Dr. C. Gordon, Ent. Branch, Dept. Agric., Ottawa.
Hudson, A. F., Millarville, Alta.
Hudson, H. F., Strathroy, Ont.
Johnson, Geo. S., Moose Jaw, Sask.
Kitto, V., Inland Revenue, Dept. Interior, Ottawa.
Leavitt, A. G., St. John, N.B.
McIntosh, W., St. John, N.B.
Mignault, Rev. J. B., Ste. Therese, Que.
Moore, G. A., 850 St. Hubert St., Montreal.
Nicholls, Arch., Saulte Ste. Marie, Ont.
Perrin, Jos., McNab's Island, Halifax, N.S.
Petch, C. E., Covey Hill, Que.
Ruhmann, Max H., Vernon, B.C.
Ross, W. A., Vineland Station, Ont.
Sanders, G. E., Bridgetown, N.S.
Sanson, N. B., Banff, Alta.
Simpson, W., Dominion Observatory, Ottawa.
Simms, H. M., 192 Ontario East, Montreal.
Sladen, F. W. L., Experimental Farm, Ottawa.
Stewart, G. M., 83 Smith St., Winnipeg, Man.
Strickland, E. H., Experimental Station, Lethbridge, Alta.
Swaine, J. M., Ent. Branch, Dept. Agric., Ottawa.
Tams, W. H. T., Midnapore, Alta.
Taverner, P. A., Victoria Memorial Museum, Ottawa.
Tothill, J. D., Fredericton, N.B.
Treherne, R. C., Agassiz, B.C.
Venables, E. P., Vernon, B.C.
Walker, Dr. E. M., Univ. of Toronto, Toronto.
Wallis, J. B., Machray School, Winnipeg, Man.
Whitehouse, F. C., Red Deer, Alta.

Willing, Prof. T. N., Univ. of Saskatchewan, Saskatoon, Sask.
Wilson, Tom, 1105 Broadway, Vancouver, B.C.
Winn, A. F., 32 Springfield Ave., Westmount, Que.
Young, C. H., Victoria Memorial Museum, Ottawa.

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## NOTES OF CAPTURES.

(Species preceded by an asterisk (*) described during 1914.)

### Lepidoptera.

(Arranged according to Dyar's List of North American Lepidoptera. U.S. Nat. Museum Bull. No. 52.)

(Dyar's number.)

**Pieridæ.**

40. *Pontia rapæ* var. *novangliæ* Scudd. Smith's Cove, N.S., Aug. 11 (Gibson).
52. *Callidryas eubule* L. Mr. W. E. Saunders, of London, Ont., reports having seen three specimens of this southern butterfly on Oct. 4 and 5. One of the specimens settled within three or four feet of him and spread its wings, so that he had an excellent view of it.
81. *Pyrisita mexicana* Bdv. Aweme, Man., Oct. 1, (N. Criddle); Sept. 27, (E. Criddle). Another very interesting record.

**Nymphalidæ.**

222. *Vanessa carye* Hbn. Not uncommon this season, Duncan, B.C., noticed ovipositing on hollyhocks, not observed in the district before, (Hanham). Mr. R. N. Chrystal found the larvæ, the past season, doing considerable damage to hollyhocks, at Vancouver, B.C.

**Hesperiidæ.**

487. *Erynnis comma* var. *laurentina* Lyman. Bonaventure Island, Que., Sept. 20, (Taverner and Young). In Dr. Skinner's Synonymic Catalogue of the N. A. Rhopalocera (1898) the reference should be corrected to read "Can. Ent., XXIV, 59, 1892. The same correction should be made in Dyar's catalogue.

**Sphingidæ.**

*Hemaris diffinis* var. *ariadne* B. and McD. (Psyche, XVII, 202, 1910). Midnapore, Alta.; common at dandelion blossoms, May 29, 30, (Tams). This is the *diffinis* of my Alberta list and the form figured by Holland as *thetis*, on Pl. 11, fig. 1, (Dod).

653c. *Hemaris diffinis* var. *rubens* Hy. Edw. Midnapore, Alta., a male, June 18, (Tams). New to Alberta. Exactly like Vancouver Island specimens, which, according to Barnes and McDunnough, are typical *rubens* or as it is listed by them. "*diffinis-thetis* var. *rubens*." It appears to me distinct from *ariadne* (Dod).

656. *H. thysbe* Fabr. var. *cimbiciformis* Steph. Several at Edmonton, Alta. May 10-16, by Mr. Val. Fernekes; the same form as that entered by me as *ruficaudis* in the Record of 1910, but Barnes and McDunnough state that the latter name is a pure synonym of *thysbe*, which has dentate margins as per Holland's figure, whilst *cimbiciformis* has margins even, (Dod).

657. *Lepisesia flavofasciata* Walk. Midnapore, Alta., May 21st, one female (A. F. Hudson). Several seen flying in sunshine at the Billing's Mill locality, on May 31st. (Hudson and Tams.) Only one previous Alberta record, (Dod).

677. *Pholus fasciatus* Sulz. Granville Ferry, N.S., Aug. 19, 1910, (Payne).

704. *Sphinx luscitiosa* Clem. Edmonton, Alta., May 10-16. A female. (V. Fernekes. The second Alberta record, (Dod).

Arctiidæ.

853. *Estigmene prima* Slosson. Moose Jaw, Sask., June, (Johnson).

872. *Hyphoraia parthenos* Harr. Midnapore, Alta., May 16-18. A few flying in sunshine, and at light. (Tams and Dod).

876. *Apantesis michabo* Grt. Moose Jaw, Sask., Sept., 1913, (Johnson).

Noctuidæ.

1029. *Apatela sperata* Grt. Midnapore, Alta., June 15. New to Alberta, (Dod).

1040. *Apatela illita* Sm. High River, Alta., June 19, (Baird).

1047. *Apharetra pyralis* Sm. Banff, Alta., (Sanson).

1050. *Merolonche lupini* Grt. Banff, Alta., June 25-July 12, three specimens, (Sanson). The specimens are a deeper blue-grey and more hoary than typical *lupini*, with less distinct maculation, and fit Smith and Dyar's description of *ursina* about equally well. But I am not at all convinced that these names really refer to distinct species, (Dod).

(1145). *Hillia vigilans* Grt. Midnapore, Alta., Aug. 26, (Dod).

1216. *Hadena contradicta* Sm. Midnapore, Alta., June 30th, a female, at treacle, (Hudson and Tams).

1247. *Hadena cinefacta* Grt. Midnapore, Alta., June 29th, at treacle, (Dod).

*Fishia derelicta* Hamps. (Ann. and Mag. N. H., Ser. 8, Vol. XII, Dec., 1913). Midnapore, Alta., Sept. 24th, a female at light. Not seen for years, (Dod). Banff, Oct. 2nd, 1913, (Sanson). This is the number 277 of the Alberta List. Sir George Hampson's type is from Aweme, Man., and Calgary and Cartwright specimens are included in the type material, (Dod).

1286. *Momophana comstocki* Grt. Edmonton, Alta., May 13th. A fine male on electric light pole. (V. Fernekes). Agrees well with Hampson's woodcut and description, and with my notes on the type from New York in the British Museum. It appears to be very rare. The species which for many years passed as *comstocki* in Vancouver Island collections is *Feralia columbiana* Smith, (Dod).

*Feralia columbiana* Sm. Quamichan Lake, B.C., March 29, first specimen I have taken, (Hanham).

1338. *Oncocnemis chandleri* Grt. Midnapore, Alta., Aug. 29, at light. (Tams). The third taken in Alberta, (Dod).

*Oncocnemis poliochroa* Hamps. (Cat. Lep. Phal. VI, p. 175, 1906.) Midnapore, Alta., Aug. 12-26, a few at light, (Tams). Not taken previously

for several years. It was entered as *chandleri* in my Alberta List (No. 185), and so passed in other western collections until Sir George Hampson recognized it as distinct and named it, (Dod).

1402. *Rhynchagrotis inelegans* Sm. Shawnigan, B.C., July 9, 1912, (Wallis). New to Canada, (Dod).

*Noctua acarnea* Sm. (Journ. N. Y. Ent. Soc. XIII, 194, Dec., 1905). Banff, July 2, 4, 10, on electric light poles, 3 males in good condition, (Sanson). Described from a male from Banff taken on July 11th, 1902, also by Mr. Sanson. This year's captures are the only specimens I ever saw besides the type, (Dod).

1492. *Noctua patefacta* Sm. Midnapore, Alta., July 11-20. A few at light, (Tams).

1497. *Noctua clemens* Sm. Midnapore, Alta., June 29. A male at treacle. Very rare in Canada, (Dod).

*Noctua dislocata* Sm. (Can. Ent., XXXVI, 149, June, 1904. Midnapore, Alta., July 2; two at treacle (Dod & Tams).

1547. *Feltia vancouverensis* Grt. Midnapore, Alta., June 2 and 30. A pair, at light, (Tams). I had only one previous Alberta record, June 9th, 1897. The male recently taken scarcely differs from Vancouver Island specimens, (Dod).

*Chorizagrotis sordida* Sm. (Journ. N.Y. Ent. Soc. XVI, 86, June, 1908). Midnapore, Alta., a rather worn female at light. Aug. 26, (Tams). This is the No. 225 of my Alberta list, which on the strength of a specimen compared with type I now believe to be *sordida,* (Dod).

1583. *Paragrotis dargo* Strk. Moose Jaw, Sask., (Johnson). *Rumatana* Sm. is an exact synonym, (Dod).

1611. *Paragrotis acornis* Sm. Midnapore, Alta., a few at light, Aug. 26th to Sept. 25th, (Tams).

1659. *Paragrotis brunneigera* Grt. Victoria, B.C., (Blackmore). I had formerly given this name to a different species in British Columbia, but the determination is correct, (Dod).

1660. *Paragrotis incallida* Sm. Midnapore, Alta. Two at light, Aug. 6th and Sept. 25th, (Tams).

1725. *Paragrotis infusa* Sm. Lethbridge, Alta., Aug. 23, 1912, (Wallis). Second Alberta record, (Dod).

*Mamestra carbonifera* Hamps. Banff, Alta., July 1st, 13th. Two males, (Sanson).

1795. *Mamestra nevadae* Grt. Midnapore, Alta., June 16-30. A few at treacle, (Dod & Tams). High River, Alta., June 19, (Baird).

1799. *Mamestra invalida* Sm. Midnapore, Alta., June 29 and July 1. Two females at treacle, (Dod). Banff, Alta., several at light, (Sanson). I now believe this to be identical with *cristifera* Walk., which however is quite distinct from *lubens* Grt., (Dod).

*Mamestra lubens* Grt. High River, Alta., June 16th, (Baird). Mr. Baird has previously taken the species at High River, though, this is the first published record for Alberta. It is distinct from *cristifera,* (Dod).

1806. *Mamestra rubefacta* Morr. Midnapore, Alta., June 5 and 19. Two fine females at treacle. A great rarity here, (Dod). Hugh River, Alta., June 19, (Baird).

1840. *Mamestra sutrina* Grt. Midnapore, Alta., June 2-18. A few at light, (Tams). Banff, Alta., (Sanson).

1874. *Mamestra tacoma* Strk. Quamichan Lake, B.C., May 22, (Hanham). Recorded in B.C. list only from Kaslo.

1918. *Scotogramma conjugata* Sm. Banff, Alta., July 3, (Sanson).

1930. *Anarta cordigera* Thunb. Midnapore, Alta., May 16-24. A few in sunshine at flowers of bear-berry (*Arctostaphylos uva-ursi*), (Hudson & Tams). New to the district, (Dod).

1937. *Anarta secedens* Walk. Banff, Alta., July 3 and 4, at light, (Sanson).

*Heliophila amygdalina* Harvey. Winnipeg, Man., June 10, 1910, (Wallis).

2015. *Graphiphora oviduca* Gn. Midnapore, Alta., June 2, at light, (Tams). New to Alberta, (Dod).

2048. *Stretchia plusiaeformis* Hy. Edw. Midnapore, Alta., April 25th, May 17th. A few at light and sallow blossoms, (Dod & Tams). The first seen for years, (Dod).

2102. *Xylina georgii* Grt. Midnapore, Alta., rare. April 30, at treacle, Sept. 21-24, at light and treacle, (Dod & Tams). The species was redescribed by Smith as *holocinerea, ancilla, fletcheri and vertina. Oregonensis* Harvey is apparently also the same species, (Dod).

2111. *Xylina thaxteri* Grt. Quamichan Lake, B.C., May 12; first I have taken in the west, (Hanham).

2146. *Asterocarpus borcalis* Sm. Red Deer Alta., about April 24, at rest freshly emerged, (Whitehouse). New to Alberta, and an extremely rare species. The type came from Cartwright, Man. There is a specimen in the British Museum supposed to have come from Luzerne Co., Pa., but its authenticity may be called in question. (Dod).

(2168) *Gortyna pallescens* Sm. Midnapore, Alta., Aug. 26-Sept. 10, a few at light, (Tams). It is not certain whether this form is really distant from *medialis,* (Dod).

2190-1. *Papaipema insulidens* Bird. Quamichan Lake, B.C., Sept. 15, not previously taken, (Hanham).

* *Papaipema lysimachiae* Bird. Montreal and north shore of Lake Erie, Can. Can. Ent. XLVI, 71.

2197. *Pyrrhia umbra* Hfr. Quamichan Lake, B.C., July 29; first I have taken in the West, (Hanham). In the B.C. list recorded only from Kaslo.

2262. *Ipimorpha subvexa* Grt. Moose Jaw, Sask. One specimen bred from a larva found spun between two poplar leaves, (Johnson). The larvæ are stated to have been abundant. The form occurs in Texas and Colorado, and has not previously been recorded from Canada, though it is very close to *nanaimo* Barnes. Grote in his 1895 list expressed a doubt as to its distinctness from *pleonectusa,* which is not unwarranted, (Dod).

*Dysocnemis borealis* Hamps. Midnapore, Alta., May 8-24, at bear-berry, and sallow blossoms in sunshine. Not rare, (Tams & Hudson). Only four or five specimens previously taken here. The type came from St. Martin's Falls, Albany River. The species has been taken at Cranbrook, B.C., by Mr. C. Garrett, (Dod).

2491. *Autographa flagellum* Wlk. Granville Ferry, N.S., July 25, 1912, (Payne).

2494. *Autographa rubidus* Ottol. Midnapore, Alta., June 2-14, at light, (Tams).

2501. *Autographa alias* Ottol. Midnapore, Alta., Aug. 27; one at light, very rare here, (Dod).

2515. *Autographa epigea* Grt. Midnapore, Alta., Aug. 15, at light, (Tams).
*Autographa orophila* Hamps. Moraine Lake, near Laggan, Alta., (Whitehouse).

2555. *Alabama argillacea* Hbn. Aweme, Man., Oct. 7, (Criddle); Winnipeg, Man., (Wallis).

2846. *Catocala pura* Hulst. Red Deer, Alta., about Sept. 1, (Whitehouse). The specimen is of a species new to Alberta, and I record it as *pura* solely on the strength of Holland's figure. Heath recorded it from Cartwright, Man., in the Record for 1907, (Dod)

2864. *Catocala ultronia* Hbn. Husavick, Man., Aug. 8, 1913, (Coates).

2872. *Catocala cerogama* Gn. Miami, Man., July 29, (Wallis); Husavick, Man., July 28, (Coates).

2890. *Catocala whitneyi* Dodge. Miami, Man., July 28, (Wallis).

3006. *Erebus odora* L. Mr. W. McIntosh informs me that two specimens of this southern noctuid were taken at St. John, N.B., during 1914, one about five miles from the city, at the end of August, by Mr. W. S. Nelson; the other specimen was collected by Mr. John McCarthy.

Pericopidæ.

3087b. *Gnophæla vermiculata* G. & R. Billing's Mill, near Millarville, Alta., July 26, flying in sunshine, (Hudson).

Notodontidæ.

3117. *Notodonta simplaria* Graef. Midnapore, Alta., June 6-30, at light, (Tams). One on fence-post, (Dod).

3151. *Schizura unicornis* S. & A. Midnapore, Alta., one at light, (Tams).

3169. *Gluphisia lintneri* Grt. Midnapore, Alta., April 19-May 1. Several at light, (Tams).

Thyatiridæ.

3177. *Pseudothyatira expultrix* Grt. Midnapore, Alta., June 30, at treacle, (Tams); High River, Alta., June 16, (Baird).

3180. *Euthyatira pudens* Gn. Midnapore, Alta., June 13, at light, (Dod), and 17th, at treacle, (Tams); new to Alberta, (Dod).

3184. *Bombycia tearlii* Hy. Edw. Midnapore, Alta., Aug. 26, at treacle, (Tams).
*Bombycia fasciata* B & McD. Kaslo, B.C., (Cockle).

Lasiocampidæ.

3223. *Epicnaptera americana* Harr. Midnapore, Alta., May 1-June 2, at light, (Tams).

Geometridæ.

3233. *Nyctobia viridata* Pack. Edmonton, Alta., May 10-16, (Fernekes). New to Albert, (Dod).

3236. *Nyctobia nigroangulata* Strk. Edmonton, Alta., May 10-16, (Fernekes). New to Alberta. Mr. Swett tells me that this is probably a western race of *limitaria*, Walk., (Dod).

3237. *Cladora atrolituata* Walk. Edmonton, Alta., May 10-16, (Fernekes). New to Alberta, (Dod).

*Eupithecia adornata* Taylor. Midnapore, Alta., May 1-June 3. A few at light, (Tams). I cannot separate this species from a specimen named *nimbicolor* Hulst for me by Taylor, (Dod).

3330. *Venusia duodecemlineata* Pack. Edmonton, Alta., May 10-16, (Fernekes). New to Alberta, (Dod).

3337. *Epirrita dilutata* D. & S. Midnapore, Alta., Sept. 7, found drowned in a water barrel. Mr. Swett considers this specimen to be a dark variety of this species, though it differs considerably from any British series. New to Alberta, (Dod).

3391. *Hydriomena californiata* Pack. Midnapore, Alta., June 5, 9; the first published record for Alberta, though a few specimens have been taken previously, (Dod).

3605. *Orthofidonia exornata* Walk. Edmonton, Alta., May 10-16, (Fernekes). New to Alberta, (Dod).

3784. *Alcis sulphuraria* Pack. Midnapore, Alta., July 21: new to Alberta, (Dod).

3862. *Ectropis crepuscularia* D. & S. Edmonton, Alta., May 10-16, (Fernekes). Exactly like British specimens; new to Alberta, (Dod).

4040. *Leucobrephos brephoides* Walk. Midnapore, Alta., flying in sunshine, April 12-19, (Tams).

Cossidæ.

4144. *Cossus populi* Walk. Midnapore, Alta., June 17, July 11, (Tams).

Tortricidæ.

* *Evetria albicapitana* Busck. MacDowell, Sask., (J. C. Blumer): Proc. Ent. Soc., Wash., XVI., Dec., 1914, p. 147.

5207. *Episimus argutanus* Clem. Aweme, Man., Sept. 2, 1913. (Criddle).

Œcophoridæ.

5920. *Epicallima argenticinctella* Clem. Pt. Pelee, Ont., (P. A. Taverner).

Elachistidæ.

* *Heliodines nyctaginella* Gibson. Aweme, Man., July 13, 1913, (Criddle): Can. Ent. XLVI., 423.

Tineidæ.

6363. *Gracilaria rhoifoliella* Chamb. Aweme, Man., Aug. 12, 1913, (Criddle).

6455. *Argyresthia oreasella* Clem. Aweme, Man., June 26, 1913, (Criddle).

Hepialidæ.

6605. *Stenopis quadriguttatus* Grt. Midnapore, Alta., July 10-12, (Tams).

6606. *Stenopis thule* Strk. Winnipeg, Man., July, (Mrs. L. H. Roberts). As mentioned by Lyman (Can. Ent. XXXVII., 31, 1905), there is a specimen in the British Museum collected in Hudson's Bay Territory, the words "Albany River, St. Martin's Falls," being indicated as the exact locality. As Lyman mentioned, the entry on the Museum register applied to a number of specimens received in the same lot, and there was a doubt in his mind as to the locality of the specimen of *thule*. The capture of

the species at Winnipeg, however, shows that it has a wide range of distribution.

6608. *Hepialus hyperboreus* var. *confusus* Hy. Edw. Kaslo, B.C., (Cockle).

## Coleoptera.

(Arranged according to Henshaw's list of Coleoptera of America, North of Mexico.)

### Cicindelidæ.

* *Cicindela pugetana* Csy. "British Columbia, (Knaus)." Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

* *Cicindela calgaryana* Csy. Lethbridge, Alta., (J. Harms); Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

### Carabidæ.

324. *Bembiduim recticolle* Lec. Lethbridge, Alta., Aug. 21, 1912, (Wallis).
678. *Amara remotestriata* Dej. Toronto, Ont., June, (Crew).
728. *Dicælus teter* Bon. Trout Creek, Toronto, Ont., May 17, (Crew).
743. *Calathus ingratus* Dej. St. Jerome, Que., May 13, (Beaulne).
759. *Platynus hypolithos* Say. Grimsby, Ont., Sept. 7, (Brimley).
829. *Platynus sordens* Kirby. St. Rose, Que., May 6, (Beaulne).
895. *Lebia scapularis* Dej. Aweme, Man., Sept. 18, 1908, Oct. 7, 1912, (E. & N. Criddle).
925. *Callida purpurea* Say. Aweme, Man., Aug. 29, 1909, (N. Criddle).
927. *Philophuga amoena* Lec. Aweme, Man., June 29, 1908, May 24, 1913, (N. Criddle).
948. *Cymindis neglecta* Hald. Aweme, Man., June 11, 1911, (N. Criddle).
976. *Brachynus ballistarius* Lec. Hull, Que., July 19, (Beaulne).
1017. *Chlænius nemoralis* Say. Coaticook, Que., Sept. 2, 1913, (Beaulne).
1031. *Chlænius purpuricollis* Rand. Ottawa, May 24, 1913, (Germain).

* *Harpalus lascious* Csy. "British Columbia;" Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

* *Harpalus recensus* Csy. W. St. Modest, Labrador, (Sherman); Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

* *Harpalus fugitans* Csy. "Frazier Valley, B.C."; Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

* *Harpalus plemalis* Csy. "New Brunswick"; Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

* *Trichocellus borcellus* Csy. Queen Charlotte Islands, (Keen); Memoirs on the Coleoptera V, by Thos. L. Casey, published 28 Nov., 1914.

### Dytiscidæ.

1293. *Coelambus sellatus* Lec. Winnipeg, Man., Oct. 14, 1911, (Wallis).
1298. *Coelambus unguicularis* Cr. Winnipeg, Man., May 11, 1912, (Wallis).
1325. *Hydroporus vittatus* Lec. Winnipeg, Man., Sept. 30, 1911, (Wallis).
1326. *Hydroporus sericeus* Lec. Winnipeg, Man., May 20, 1911, (Wallis).
1349. *Hydroporus tartaricus* Lec. Winnipeg, Man., April 8, 1911, (Wallis).
1411. *Agabus seriatus* Say. Peachland, B.C., Aug. 2, 1912, (Wallis).
1433. *Agabus anthracinus* Mann. Winnipeg, Man., Oct. 14, 1911, (Wallis).

1439. *Agabus reticulatus* Kirby. Winnipeg, Man., April 8, 1911, (Wallis).
1441. *Agabus lecontei* Cr. Lethbridge, Alta., Aug. 21, 1912, (Wallis).
1498. *Graphoderes liberus* Say. Ottawa, April 3, (Germain).
1499. *Graphoderes fasciatocollis* Harr. Winnipeg, Man., April 21, 1911, (Wallis).
*Graphoderes perplexus* Sharp. Winnipeg, Man., June 6, 1911, (Wallis).
*Graphoderes elatus* Sharp. Stony Mt., Man., April 23, 1910, (Wallis).

Hydrophilidæ.

1542. *Helophorus oblongus* Lec. Longueuil, Que., (Emile).

Silphidæ.

1726. *Choleva luridipennis* Mann. Onah, Man., May 24, 1912, in weasel's nest, (Criddle & Wallis).

Scydmænidæ.

1841. *Scydmaenus salinator* Lec. Onah, Man., May 24, 1912, (Criddle & Wallis); Ottawa, July 14, 1913, (Germain).
*Euconnus occulatus* Csy. Ottawa, July 12, (Germain).

Pselaphidæ.

9361. *Pselaphus bellax* Csy. Winnipeg, Man., April 17, 1911, (Wallis).
1886. *Decarthron abnorme* Lec. Onah, Man., May 24, 1912, (Criddle & Wallis); Husavick, Man., June 22, 1912, (Criddle & Wallis).
1916. *Bryaxis brendelii* Horn. Bird's Hill, Man., (Wallis).
1938. *Bryaxis puncticollis* Lec. Husavick, Man., June 22, 1912, (Criddle & Wallis).

Staphylinidæ.

*Aleochara pleuralis* Csy. Ottawa, June 27, (Germain).
2096a. *Heterothops fusculus* Lec. Ottawa, May 3, (Germain).
2102. *Quedius peregrinus* Grav. Ottawa, April 14, (Germain).
2166. *Philonthus cautus* Er. Ottawa, July 27, 1913, (Germain).
2462. *Stenus arculus* Er. Ottawa, July 14, 1913, (Germain).
2560. *Lithocharis* (*Trachysectus*) *confluens* Say. Ottawa, Aug. 22, (Germain).
2626. *Tachinus frigidus* Er. Ottawa, April 27, (Germain).

Trichopterygidæ.

2944. *Trichopteryx aspera* Hald. Ottawa, July 19, (Germain).

Corylophidæ.

3011. *Sacium lugubre* Lec. Winnipeg, Man., June 4, 1912, (Wallis).

Coccinellidæ.

3071. *Harmonia 14-guttata* L. Micou Harbour, Que., June 9, (Young).
3073. *Mysia* (*Neomysia*) *pullata* Say. Gaspe, Que., Sept. 9, (Young).

Colydiidæ.

3271. *Lasconotus pusillus* Lec. Peachland, B.C., July 19, 1912, (Wallis).
3290. *Cerylon castaneum* Say. Aweme, Man., June 9, (Criddle); Husavick, Man., June 22, 1912, (Wallis).

Cucujidæ.

3300. *Silvanus bidentatus* Fab. Winnipeg, Man., May 18, 1912, (Wallis).
3326. *Læmophlæus convexulus* Lec. Winnipeg, Man., May 30, 1912, (Wallis).

Cryptophagidæ.

3375. *Cryptophagus nodangulus* Zimm. Ottawa, July 19, 1913, (Germain).

Mycetophagidæ.

3393. *Mycetophagus flexuosus* Say. Winnipeg, Man., May 12, 1912, (Wallis).

Histeridæ.

3482. *Hister immunis* Er. Ottawa, June-Aug., (Germain).
3484. *Hister cognatus* Lec. Ottawa, July 14, under a dead robin, (Germain).
3505. *Hister sedecimstriatus* Say. Ottawa, July 14, under a dead robin, (Germain).
3515. *Hister (Phelister) subrotundus* Say. Ottawa, June 19, 1913. (Germain).
3524. *Hister (Platysoma) coarctatus* Lec. Ottawa, May 13, 1913, (Germain).
3525. *Hister (Platysoma) punctiger* Lec. Ottawa, June 29, 1913, (Germain).
3592. *Saprinus conformis* Lec. Ottawa, June 13, 1913, (Germain).
3614. *Saprinus sphæroides* Lec. Ottawa, under a dead fish, June 3, (Germain).
3633. *Plegaderus transversus* Say. Ottawa, Aug. 3, 1913, (Germain).

Nitidulidæ.

3700. *Epuræa erichsonii* Reit. Winnipeg, Man., June 12, 1912, (Wallis).
3704. *Epuræa immunda* var. *flavomaculata* Makl. Stony Mt., Man., Oct. 8, 1911, (Wallis).

Latridiidæ.

*Melanopthalma cavicollis* Com. Winnipeg, Man., Sept. 18, 1912, (Wallis).
*Coninomus constrictus* Gyll. Ottawa, July 13, 1913, (Germain).
*Enicmus tenuicornis* Lec. Ottawa, July 14, (Germain).
3799. *Corticaria dentigera* Lec. Ottawa, May 27, (Germain).
3818. *Corticaria cavicollis* Mann. Onah, Man., May 24, 1912, (Criddle & Wallis).
*Corticaria valida* Fall. Husavick, Man., June 22, 1912, (Wallis).

Trogositidæ.

*Tenebrioides occidentalis* Fall. Peachland, B.C., Aug. 10, 1912, (Wallis).

Heteroceridæ.

3960. *Heterocerus tristis* Mann. Stony Mt., Man., Oct. 8, 1911, (Wallis).
*Heterocerus brunneus* Melsh. Husavick, Man., June 22, 1912, (Criddle & Wallis).

Elateridæ.

4113. *Cardiophorus tenebrosus* Lec. Victoria, B.C., (Blackmore).
4166. *Oedostethus femoralis* Lec. Aweme, Man., July 3, (Criddle).
4166. *Corymbites sulcicollis* Say. Grimsby, Ont., July 4, 1913, (Brimley).
4176. *Corymbites medianus* Germ. Aweme, Man., July 19, (Criddle).

4484. *Corymbites cruciatus* Linn. Aweme, Man., June 29, 1912, (T. Criddle).
4511. *Hemicrepidius (Asaphes) bilobatus* Say. Grimsby, Ont., Aug. 3, 1913, (Brimley).

Buprestidæ.

4583. *Dicerca tenebrosa* Kirby. Granville Ferry, N.S., July 27, 1912, (Payne).
4606a. *Buprestis subornata* Lec. Peachland, B.C., July 15, 1912, (Wallis).
4608. *Buprestis sulcicollis* Lec. Ottawa, July 3, 1911, (Germain).

Lampyridæ.

4785. *Eros simplicipes* Mann. Trout Creek, Toronto, May 17, (Crew).
4826. *Pyractomena lucifer* Melsh. Winnipeg, Man., June 24, 1911, (Wallis).
4906. *Podabrus lævicollis* Kirby. Husavick, Man., June 22, 1912, (Wallis).
4932. *Telephorus carolinus* Fab. Husavick, Man., June 22, 1912, (Wallis).
*Ditemnus latilobus* Blatch. Onah, Man., June 24, 1912, (Criddle & Wallis).

Cleridæ.

5167. *Clerus quadriguttatus* Oliv. Husavick, Man., Sept. 24, 1912, (Coates).
5215a. *Chariessa onusta* Say. Carp, Ont., July 21, (Gibson).

Cioidæ.

*Cis pistoria* Csy. Winnipeg, Man., May 18, 1912, (Wallis).
*Octotemnus denudatus* Csy. Winnipeg, Man., May 18, 1912, (Wallis).

Scarabæidæ.

5468. *Aegialia lacustris* Lec. Ottawa, July 3, 1913, (Germain).
5514. *Aphodius erraticus* L. Ottawa, May-July, (Germain); Hull, Que., May 12, (Kitto).
5538. *Ophodius leopardus* Horn. Aylmer, Que., July 3, 1913, (Germain).
5771. *Lachnosterna marginalis* Lec. Strathroy, Ont., June 23, 1913, on hazel, (H. F. Hudson).
5777. *Lachnosterna ilicis* Knoch. Strathroy, Ont., June 30, on locust, (H. F. Hudson).
10,235. *Lachnosterna inversa* Horn. Strathroy, Ont., June 23, 1913, on elm, (H. F. Hudson).
5925. *Cremastochilus knochii* Lec. Aweme, Man., May 14, June 10, (Criddle).

Cerambycidæ.

5967. *Tragosoma harrisii* Lec. Winnipeg, Man., July, (L. H. Roberts).
6007. *Merium proteus* Kirby. Aweme, Man., June 9, (Criddle).
6099. *Molorchus longicornis* Lec. Maple Bay, V. I., B.C., July 19, only one taken before (Victoria); appears to be quite rare, (Hanham).
6229. *Pyrotrichus vitticollis* Lec. Quamichan Lake, V.I., B.C., April 26, May 2, (Hanham).

Chrysomelidæ.

6551. *Zeugophora scutellaris* Suffr. Lethbridge, Alta., June, 1913, (Strickland).
6558. *Syneta carinata* Mann. Little Current River, (Hudson Bay Slope) Ont., July 20, 1903, (W. J. Wilson).

6559. *Syneta albida* Lec. Agassiz, B.C., May, 1913, (Gibson).
6560. *Syneta simplex Lec.* Inverness, B.C., June, 1910, (Keen).
6679. *Pachybrachys peccans* Suffr. Winnipeg, Man., June 17, 1911, (Wallis).

Bruchidæ.

7147. *Bruchus calvus* Horn. Aylmer, Que., July 8, 1912, (Germain).

Tenebrionidæ.

7530. *Hypophlœus substriatus* Lec. Husavick, Man., June 22, 1912, (Wallis).

Melandryidæ,

*Pisenus humeralis* Kirby. Ottawa, Aug. 8, 1913, (Germain).
7649. *Penthe obliquata* Fab. Husavick, Man., Aug. 27, 1910, (Wallis).
7665. *Euchodes sericea* Hald. Aweme, Man., July 1, 1913, (E. Criddle).
7666. *Serropalpus barbatus* Schall. Granville Ferry, N.S., (Payne); Grimsby, Ont., July 1, (Brimley).
7696. *Stenotrachelus arctatus* Say. Banff, Alta., Oct. 5, 1912, (Sanson).

Pythidæ.

7707. *Crymodes discicollis* Lec. Micou Harbour, Que., June 16, (Young).
7717. *Salpingus virescens* Lec. Husavick, Man., June 22, 1912, (Wallis).

Mordellidæ.

7846. *Mordellistena unicolor* Lec. Ottawa, July 18, 1913, (Germain).

Anthicidæ.

7868. *Nematoplus collaris* Lec. Ottawa, May 8, 1913, (Germain).
7940. *Anthicus formicarius* Laf. Onah, Man., May 24, 1912, (Criddle & Wallis).
7943. *Anthicus californicus* Laf. Winnipeg, Man., April 27, 1911, (Wallis).
7957. *Anthicus flavicans* Lec. Winnipeg, May 13, 1911, (Wallis).
7975. *Anthicus coracinus* Lec. Winnipeg, Man., April 17, 1911, (Wallis).
*Anthicus (Sapintus) festivans* Csy. Winnipeg, Man., April 17, 1911, (Wallis).

Pyrochroidæ.

7992. *Pyrochroa femoralis* Lec. Grimsby, Ont., June 15, (Brimley).

Meloidæ.

8084. *Epicauta pruinosa* Lec. Winnipeg, Man., June 17, 1911, (Wallis). New to Manitoba.

Rhinomaceridæ.

8199. *Rhinomacer bombifrons* Lec. Banff, Alta., May 20, 1909, (Sanson).

Otiorhynchidæ.

10,796. *Barypithes pellucidus* Boh. Ottawa and Montreal, June, July, 1913, (Germain).
8334. *Scythropus elegans* Coup. Banff, Alta., April 29, 1911, (Sanson).
*Ceutorhynchus cyanipennis* Ill. Ottawa, July 26, 1913, (Germain).

Curculionidæ.

8346. *Sitones hispidulus* Germ. Ottawa, June 2, (Germain).
8357. *Trichalophus simplex* Lec. Banff, Alta., June 21, 1912, (Sanson).
8436. *Lepyrus gemellus* Kirby. Banff, Alta., July 15, 1912, (Sanson).
8514. *Stephocleonus cristatus* Lec. Monarch, Alta., May 5, 1913, (Gibson).
8581. *Linellus friliformis* Lec. Ottawa, (Germain).
*Elleschus scanicus* Payk. Ottawa, July 12, 1913, (Germain).

## Diptera.

(Arranged according to a Catalogue of North American Diptera, by J. M. Aldrich, Smithsonian Misc. Coll. XLVI, No. 1,444. The numbers refer to the pages in the catalogue).

Many of the species of diptera here recorded are well known, but they are included owing to the fact that their collection in the localities indicated extend the known distribution of most of them. Bro. Germain, of Ottawa, has collected most industriously, and to his zeal we are able to record many of his captures, the determinations having been largely made by Mr. C. W. Johnson, of the Boston Museum of Natural History.

Tipulidæ.

101. *Tipula caloptera* Loew. Ottawa, July, 1913, (Germain).
* *Tipula ottawaensis* Dietz. Aweme, Man., June 27, 28, July 30, 1913, Aug. 4, 1912, (Criddle); Aylmer, Que., April 24, June, 1913, (Beaulne); Ottawa, June 28, July 11, 13, (Beaulne); Trans. Amer. Ent. Soc., XL, 349, Dec., 1914.
* *Tipula criddlei* Dietz. Aweme, Man., June 1-20, July 20, 1912, (Criddle); Trans. Amer. Ent. Soc., XL, 360, Dec., 1914.

Chironomidæ.

115. *Orthocladius nivoriundis* Fitch. Ottawa, May 11, 1913, (Germain).
115. *Camptocladius byssinus* Schrank. Ottawa, May 23, 1913, (Germain).
118. *Tanypus bifasciatus* Coq. Ottawa, June 1, 1913, (Germain).
118. *Tanypus monilis* L. Ottawa, June 1, 1913, (Germain).

Mycetophilidæ.

142. *Acnemia flaveola* Coq. Montreal, Que., July, (Beaulieu).
151. *Sciara sciophila* Loew. Lethbridge, Alta., July 22, 1913, (Strickland).

Cecidomyidæ.

* *Hormomyia bulla* Felt. "Province of Ontario, Brodie"; Can. Ent. XLVI. 286.
* *Rhabdophaga swainei* Felt. Ottawa, May, (Swaine); Ottawa Naturalist, XXVIII, 77.

Bibionidæ.

167. *Dilophus stigmaterus* Say. Lethbridge, Alta., Aug. 5, (Strickland).
168. *Scatopse pygmæa* Loew. Lethbridge, Alta., July 21, 1913, (Strickland).

Simuliidæ.

* *Simulium arcticum* Malloch. Kalso, B.C., (H. G. Dyar); Bear Lake, B.C., (R. P. Currie); U. S. Dept. Agr., Bull. Tech. Series No. 26, p. 37.

* *Prosimulium mutatum* Malloch. Kaslo, B.C., (H. G. Dyar); U. S. Dept. Agr., Bull. Tech. Series No. 26, p. 20.

* *Prosimulium pleurale* Malloch. Kalso, B.C., (R. P. Currie); U. S. Dept. Agr., Bull. Tech. Series No. 26, p. 17.

Rhyphidæ.

172. *Rhyphus alternatus* Say. Ottawa, May 12, 1913, (Germain).
172. *Rhyphus punctatus* Fab. Ottawa, June 8, 1913, (Germain).

Stratiomyidæ.

178. *Chrysochroma nigricornis* Loew. Ottawa, May 3, (Germain).
179. *Sargus cuprarius* L. Ottawa, July 20, (Germain).
180. *Sargus viridis* Say. Lethbridge, Alta., June 28, (Strickland); Ottawa, Aug. 12, (Germain).
180. *Microchrysa polita* L. Ottawa, June 8, (Germain).
180. *Macrosargus clavis* Will. Ottawa, July 1, (Germain).
186. *Odontomyia pilimanus* Loew. Ottawa, (Germain).
187. *Odontomyia virgo* Wied. Ottawa, May 21, (Germain).
190. *Nemotelus crassus* Loew. Ottawa, June 28, (Germain).
190. *Nemotelus unicolor* Loew. Ottawa, June 28, (Germain).

Tabanidæ.

195. *Chrysops æstuans* V. d. Wulp. Ottawa, (Germain).
198. *Chrysops striatus* O. S. Ottawa, June 24, (Germain).
201. *Tabanus astutus* O. S. Aylmer, Que., May 3, (Germain).
204. *Tabanus hirtulus* Bigot. Aweme, Man., (Criddle).
204. *Tabanus lasiophthalmus* Macq. Aweme, Man., June 17, (Criddle).
207. *Tabanus sonomensis* O. S Aweme, Man., June 14, (Criddle).

Leptidæ.

215. *Leptis mystacea* Macq. Ottawa, June 24, (Germain).
215. *Leptis scapularis.* Ottawa, June 21, (Germain).
216 *Chrysophila proxima* Walk. Ottawa, June 24, (Germain).

Cyrtidæ.

220. *Oncodes pallidipennis* Loew. Ottawa, Aug. 14, (Germain).

Bombyliidæ.

223. *Spogostylum limatulus* Say. Ottawa, June 14, (Germain).
230. *Anthrax fulviana* var. *nigricauda* Loew. Ottawa, June 8, (Germain).
232. *Anthrax morio* L. Ottawa, May and June, (Germain).
234. *Anthrax tegminipennis* Say. Ottawa, June 8, (Germain).
234. *Anthrax tegminipennis* var. *sachenii* Coq. Lethbridge, Alta., Sept. 16, 1913, (Strickland). Mr. C. W. Johnson when determining this specimen reported "probably a good species."
247. *Psilocephala hæmorrhoidalis* Macq. Ottawa, June 10, (Germain).
248. *Thereva flavicincta* Loew. Otttawa, June 10, (Germain).

Asilidæ.

254. *Leptogaster bodius* Loew. Ottawa, (Germain).
254. *Leptogaster flavipes* Loew. Ottawa, May 8, (Germain).
262. *Stichopogon trifasciatus* Say. Ottawa, June 10, (Germain).
269. *Pogonosoma dorsatum* Say. Ottawa, June 10, (Germain). This is a rare species in the east. Mr. C. W. Johnson who made the determination states that this is the second record from the east since the species was described from "near Philadelphia."
283. *Asilus sadyates* Walk. Ottawa, June 10, (Germain). Only recorded from Ohio in Aldrich's catalogue.

Dolichopodidæ.

285. *Psilopodinus inermis* Loew. Ottawa, July 20, (Germain).
288. *Diaphorus mundus* Loew. Montreal, Que., July, (Beaulieu).
* *Medeterus emarginatus* Van Duzee. Kearney, Ont., July 6, 1909; Ent. News, XXV, 439.
297. *Hydrophorus æstuum* Loew. Ottawa, Aug, 17, (Germain).
297. *Scellus exustus* Walk. Ottawa, Aug 14, (Germain).
300. *Dolichopus comatus* Loew. Ottawa, July, (Germain).

Empididæ.

310. *Stilpon varipes* Loew. Montreal, Que., April, (Beaulieu).
311. *Drapetis medetera* Mel. Ottawa, July 27, (Germain).
325. *Hilaria leucoptera* Loew. Montreal, Que., July, (Beaulieu).

Lonchopteridæ.

333. *Lonchoptera lutea* Panz. Montreal, Aug., (Beaulieu).

Pipunculidæ.

343. *Pipunculus similis* Hough. Ottawa, July 23, (Germain).
*Pipunculus affinis* Cress. Jr. In the Transactions of the American Ent. Soc. XXXVI, p. 283, the locality of this species is given as "Cottage Beaulieu, (Beaulieu) Que." This should be corrected to read—Montreal, Que., (Beaulieu).

Syrphidæ.

349. *Chrysogaster pictipennis* Loew. Ottawa, (Germain).
351. *Paragus angustifrons* Loew. Ottawa, July 27, (Germain).
361. *Melanostoma obscurum* Say. Ottawa, June 8, (Germain).
393. *Helophilus integer* Loew. Ottawa, June 8, (Germain).
402. *Criorhina decora* Macq. Ottawa, reared from larva found in rotten wood, May 3, (Germain).

Conopidæ.

412. *Oncomyia abbreviata* Loew. Ottawa, July 11, 27, (Germain).

Tachinidæ.

451. *Ocyptera dorsiades* Wlk. Ottawa, July, (Germain).
482. *Microphthalma disjuncta* Wied. Ottawa, Aug. 3, (Germain).

Dexiidæ

500. *Myiocera rava* V. d. Wulp. Ottawa, July 11, (Germain).
504. *Ptilodexia tibialis* Desv. Ottawa, Aug. 4, 12, (Germain).
507. *Thelaira leucozona* Panz. Ottawa, Aug. 8., (Germain).
* *Sarcophaga kelliyi* Ald. Aweme, Man., (N. Criddle); Journ. Agr. Research, U. S. Dept. Agr., Sept. 21, 1914, p. 443.

Sarcophagidæ.

* *Ravinia communis* Parker. "Canada"; Proc. Boston Soc. Nat. History, Vol. 35, p. 55.
* *Ravinia latisetosa* Parker. "Canada"; Proc. Boston Soc. Nat. History, Vol. 35, p. 63.

Muscidæ.

523. *Lucilia sylvarum* Meig. Ottawa, Aug. 23, (Germain).
525. *Pyrellia serena* Meig. (=*cyanicolor* Zett.), Ottawa, July 14, (Germain).
* *Hypodermodes solitaria* Knab. High River, Alta., (Baird); Can. Ent. XLVI, 326.

Anthomyidæ.

540. *Hyetodesia deleta* Stein. Ottawa, July 20, (Germain).
542. *Hyetodesia serva* Meig. Ottawa, Aug. 3, (Germain).
545. *Spilogaster nitens* Stein. Ottawa, Sept. 14, (Germain); Montreal, Que., July, (Beaulieu).
545. *Spilogaster signia* Walk. Ottawa, July 12, (Germain).
546. *Limnophora compuncta* Wied. Ottawa, Aug. 24, (Germain).
551. *Hydrophoria devisa* Meig. Montreal, Que., June, July, (Beaulieu).
557. *Phorbia ruficeps* Zett. Ottawa, Aug. 8, (Germain).
561. *Cœnosia lata* Walk. Montreal, Que., July, (Beaulieu).
561. *Cœnosia pallipes* Stein. Rigaud, Que., Montreal, Que., June, Aug., (Beaulieu).
563. *Schœnomyza dorsalis* Loew. Montreal, Que., Aug., (Beaulieu).
563. *Lispa albitarsis* Stein. Montreal, Que., July, (Beaulieu); Ottawa, Aug 17, (Germain).

Scatophagidæ.

565. *Cordylura confusa* Loew. Ottawa, Aug 3, (Germain).
566. *Parallelomma varipes* Walk. Ottawa, June 21, Aug 12, (Germain).
569. *Scatophaga merdaria* Fab. Ottawa, May-Aug., (Germain).

Sciomyzidæ.

578. *Sciomyza obtusa* Fallens. Ottawa, Aug. 12, (Germain); Montreal, Que., July, (Beaulieu).
*Dryomyza varia* Coq. Ottawa, July 27, (Germain). Second specimen I have seen, (C. W. J.).
579. *Tetanocera flavescens* Loew. Ottawa, (Germain).
579. *Tetanocera pallida* Loew. Ottawa, Aug. 8, (Germain).
579. *Tetanocera lineata* Day. Ottawa, Aug. 8, (Germain). Malloch, Can. Ent. XLVI, 324, says: "This species belongs to the genus *Hidroneura* Handel and is synonymous with *H. rufa* Panzer of the European fauna.
581. *Sepedon fuscipennis* Loew. Ottawa, Aug. 14, 24, (Germain).

Sapromyzidæ.

582. *Lonchæa polita* Say. Ottawa, July 27, Aug. 24, (Germain).
584. *Sapromyza bispina* Loew. Ottawa, Aug. 8, (Germain).

Ortalidæ.

589. *Rivellia viridulans* Desv. Ottawa, Aug. 8, (Germain).
592. *Melieria similis* Loew. Ottawa, July, (Germain).

Trypetidæ.

606. *Rhagoletis pomonella* Walsh. Lethbridge, Alta., July 19, (Strickland). The capture of this specimen in Southern Alberta extends very much the known distribution in Canada of this very injurious insect.
611. *Tephritis angustipennis* Loew. Ottawa, July, (Germain).
612. *Tephritis geminata* Loew. Ottawa, July 6, (Germain).
613. *Euaresta festiva* Loew. Ottawa, July 27, (Germain).

Micropezidæ.

616. *Calobata antennipes* Say. Ottawa, June 24, (Germain).

Ephydridæ.

623. *Notiphila scalaris* Loew. Montreal, Que., July, (Beaulieu).
627. *Hydrellia ischiaca* Loew. Montreal, Que., July, (Beaulieu).
628. *Pelina truncatula* Loew. Montreal, Que., Aug., (Beaulieu).
629. *Parydra pinguis* Walk. Montreal, Que., July, (Beaulieu).

Oscinidæ.

633. *Chlorops grata* Loew. Ottawa, Aug. 12, (Germain).
633. *Chlorops melanocera* Loew. Ottawa, July 3, (Germain).
637. *Gaurax festivus* Loew. Lethbridge, Alta., July 8, 1913, (Strickland).
*Hippelates longulus.* Prof. J. M. Aldrich recently informed me (27. VII, 1914) that "there is a *Hippelates longulus* described by Becker (Annales Mus. Nat. Hung. X, 89, 1912, with the locality '1 exemplar aus Kanada (Coll. Aldrich).' The specimen was returned to me and I see that the locality was incorrectly stated; it should read Grenada, W. I. Hence the species should not be recorded from Canada."

Drosophilidæ.

643. *Drosophila graminum* Fall. Montreal, Que., Aug., (Beaulieu).

Geomyzidæ.

645. *Anthomyza terminalis* Loew. Montreal, July, (Beaulieu).

Agromyzidæ.

646. *Ptytomyza obscurella* var. *illicicola* Loew. Hull, Que., reared from leaves of *Ilex verticillata* var. *tenuifolia*, (Gibson).
647. *Agromyza angulata* Loew. Montreal, Que., July, (Beaulieu).
652. *Leucopsis nigricornis* Egger. Ottawa, Aug. 12, (Germain).

## Hymenoptera.

Considerable collecting was done in this order in various parts of Canada during 1914, but much of the material has not as yet been worked up. The following records seem worthy of inclusion now.

**Xyelidæ.**

*Macroxyela distincta* MacG. Ottawa, Aug. 21, (Germain). Not previously recorded from Canada.

**Tenthredinidæ.**

*Dolerus luctatus* MacG. Ottawa, July 3, (Germain). Not previously recorded from Canada.
*Dolerus conjugatus* MacG. Ottawa, (Germain).
*Dolerus dysporus* MacG. Ottawa, (Germain).
*Dolerus neocollaris* MacG. Ottawa, June 12, 1913, (Germain).
*Dolerus neoaprilis* MacG. Ottawa, June 3, 1913, (Germain).
* *Astochus fletcheri* MacG. Kaslo, B.C., May 28, 1906, (Fletcher). Can. Ent. XLVI, 108.
*Tenthredo angulifera* Nort. Ottawa, July 28, 1913, (Germain).
*Tenthredo basalaris* Say. Ottawa, July 17, (Germain).
*Macrophya epinota* Say. Ottawa, July 3, (Germain).
*Macrophya pannosa* Say. Ottawa, July 18, (Germain).
*Pachynematus pubescens* Marl. Ottawa, Aug. 27, (Germain). Not previously recorded from Canada.
*Monophadnus bipunctatus* MacG. Ottawa, June 27, 1913, (Germain).
*Monophadnoides conspicuous* MacG. Ottawa, July 30, 1913, (Germain).
* *Metallus bethunei* MacG. Jordan Harbour and St. Catharines, Ont., reared from a leaf mining larva on blackberry, (Caesar). Can. Ent. XLVI, 367.

**Xiphydridæ.**

*Xiphydria maculata* Say. Ottawa, July 27, (Germain).
*Xiphydria provancheri* Cress. Ottawa, Aug. 3, (Germain). Harrington has taken the species at Hull, Que., (June 15).

**Cephidæ.**

*Janus abbreviatus* Say. Ottawa, Aug. 3, 1913, (Germain).

**Cynipidæ.**

*Rhodites gracilis* Beut. Toronto, Ont., (Cosens).

**Braconidæ.**

*Microplitis alaskensis* Ashm. Kelowna, B.C., June, (Ruhmann).

**Ichneumonidæ.**

* *Ephialtes brevis* Morley. District of Hudson's Bay (Albany River, St. Martin's Falls, etc.), 1844, (George Barnston). Revision of the Ichneumonidæ, Part III, p. 23, (British Museum) by C. Morley.
* *Apachtis rugulosa* Morley. Inverness, B.C., 1890, (Keen). Revision of the Ichneumonidæ, Part III, p. 34, (British Museum) by C. Morley.

*Ichneumon cervulus* Prov. Smith's Cove, N.S., July 15, (Gibson).
*Ichneumon milvus* Cr. Smith's Cove, N.S., July 15, (Gibson).
*Ichneumon subdolus* Cr. Smith's Cove, N.S., July 15, (Gibson).
*Ichneumon trizonatus* Prov. Smith's Cove, N.S., July, (Gibson).
*Amblyteles belangeri* Cr. Smith's Cove, N.S., July, (Gibson).

Crabronidæ.

*Crabro* (*Protothyreopus*) *dilectus* Cr. Aweme, Man., Aug. 3-13, (Criddle); Trout Creek and Thompson River, July 22-Aug. 12, (Wilson).

Andrenidæ.

*Andrena bicolor* Prov. Truro, N.S., May 18, 1913, (C. B. Gooderham); Aweme, Man., May 8-14, (Criddle).
*Andrena fragariana* Graen. Ottawa, May 10, (Sladen).
*Andrena helianthi* Robt. Toronto, Ont., Sept. 9, 1888, (Dr. Brodie).

Anthophoridæ.

*Clisodon terminalis* Cr. Shawnigan, Van. Is., B.C., (Sladen): Ste. Anne de la Pocatiere, Que., (Sladen).
*Anthophora occidentalis* Cr. Lethbridge, Alta., June 28, (Sladen).

Megachilidæ.

*Megachile vidua* Sm. Laggan, B.C., Vancouver Island, B.C., Charlottetown, P.E.I., (Sladen).

Bombidæ.

*Bombus borealis* Kirby. Scott, Sask.; Rosthern, Sask., (Sladen).
*Bombus couperi* Cr. Painsec, N.B., Aug. 4, (Sladen).
*Bombus centralis* Cr. Invermere, B.C.; Vernon, B.C., (Sladen).
*Bombus edwardsii* Cr. Without red band, Invermere, B.C.; with red band, Sidney, B.C., (Sladen).
*Bombus flavifrons* Cr. Agassiz, B.C., (Sladen).
*Bombus frigidus* Cr. Invermere, B.C., June 30, (Sladen).
*Bombus huntii* Greene. Rosthern, Sask., (Sladen).
*Bombus nevadensis* Cr. Invermere, B.C., (Sladen); Lethbridge, Alta., (Strickland).
*Bombus terricola* Kirby. Salmon Arm, B.C., (Sladen). Not previously recorded from British Columbia.

## Hemiptera.

As far as we know little systematic collecting in this order has been effected throughout Canada during 1914. Among the material studied the following species seem worthy of record here.

Cicadidæ.

*Cicada canicularis* Harr. Aweme, Man., Aug.-Sept., (N. & T. Criddle).
*Okanogana noveboracensis* Em. Treesbank, Man., June 14, (E. Criddle).

Psyllidæ.

* *Livia caricis* Crawford. Glacier, B.C., (Hubbard & Schwarz); Bull. 85, U. S. N. M., p. 23.

* *Arytaina fuscipennis* Crawford. North Bend, B.C., (Schwarz); Bull. 85, U. S. N. M., p. 112.

* *Psylla sinuata* Crawford. Ungava Bay, Labrador, July 22, (L. M. Turner); Bull. 85, U. S. N. M., p. 140.

* *Psylla americana* Crawford. Banff, Alta., June, (Hubbard & Schwarz); Bull. 85, U. S. N. M., p. 147.

* *Psylla americana flava* Crawford. Victoria, B.C., (Hubbard & Schwarz); Bull. 85, U. S. N. M., p. 147.

Aphididæ.

*Phylloxera castaneæ* Hald. Vineland, Ont., Sept. 18, on chestnut, (Ross).

*Hamamelestes spinosus* Shimer. Vineland, Ont., June 22, on *Betula papyrifera,* (Ross).

*Tetraneura graminis* Monell. Vineland, Ont., July 7, on *Ulmus americana,* (Ross).

*Tetraneura ulmisacculi* Patch. Vineland, Ont., June 29, on *Ulmus montana,* (Ross).

*Aphis cardui* L. Vineland, Ont., on *Cirsium lanceolatum* and Cinerarias, (Ross).

*Aphis pseudobrassicae* Davis. Aweme, Man., Oct. 24, (Criddle). This recently described species doubtless occurs in other localities.

*Aphis rufomaculata* Wils. Grimsby, Ont., Nov. 16, on chrysanthemums, (Ross).

*Rhopalosiphum lactucæ* Kalt. Vineland, Ont., July 9, on *Sonchus asper,* (Ross).

*Rhopalosiphum ligustri* Kalt. Vineland, Ont., on *Ligustrum vulgare,* (Ross).

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The arrangement of the Hemiptera-Heteroptera follows Bank's Catalogue, (Amer. Ent. Soc'y, 1910): the numbers refer to the pages in the catalogue.

Nepidæ.

8. *Nepa apiculata* Harr. Ottawa, June 24, (Germain).

Saldidæ.

12. *Salda pallipes* Fabr. Ottawa, July 26, 1912, (Germain).

Anthocoridæ.

*Anthocoris repertus* Uhl. Ottawa, June 20, 1912, (Germain).

24. *Piezostethus sordidus* Reut. Ottawa, Aug. 8, 1913, (Germain).

Gerridæ.

*Gerris buenoi* Kirkaldy. Ottawa, Aug. 10, 1913, (Germain).

Capsidæ.

*Chlamydatus associatus* Uhl. Bowmanville, July 18, 1913, (Ross).
*Phytocoris scrupeus* Say. Moose Jaw, Sask., (Johnson).

Aradidæ.

53. *Aradus cinnamoneus* Panz. Ottawa, July 12, 1913, (Germain).
54. *Aneurus inconstans* Uhler. Ottawa, (Germain).
55. *Corythuca marmorata* Uhler. Ottawa, June 20, 1913, (Germain).

Lygæidæ.

58. *Cymus angustatus* Stal. Ottawa, Aug. 10, 1913, (Germain).
58. *Cymus discors* Horv. Ottawa, Aug. 20, 1913, (Germain).
60. *Phlegyas abbriatus* Uhl. Ottawa, July-Aug., (Germain).
62. *Nysius coloradensis* Baker. Ottawa, June 2, 1913, (Germain).
*Nysius providus* Uhl. Ottawa, June 27, 1913, (Germain).
65. *Ligyrocoris costalis* Van D. Ottawa, June 27, 1913, (Germain).
66. *Ozophora picturata* Uhl. Ottawa, July 13, 1913, (Germain).
68. *Scolopostethus atlanticus* Horv. Ottawa, July 13, 1913, (Germain).
68. *Trapezonotus rufipes* Stal. Ottawa, June 27, 1913, (Germain).
69. *Geocoris bullatus* Say. Ottawa, June 2, 1913, (Germain).

Corcidæ.

* *Ceraleptus pacificus* Barker. "Vancouver Island"; Jour. N. Y. Ent. Soc. XXII, 167.

## Orthoptera.

Grylloblattidæ.

* *Grylloblatta campodeiformis* Walker. Sulphur Mountain, Banff, Alta., June 29, 1913, (Walker); Can. Ent., XLVI, 94.

Mantidæ.

*Mantis religiosa* L. A specimen of this European Praying Mantis was received at the Entomological Branch on Oct. 10, 1914, from Mr. J. H. Herrington, Carrying Place, Ont. Dr. E. M. Walker informs me that the insect was also found at Picton, Ont., and through Prof. C. J. S. Bethune I learned of a specimen which was taken near Simcoe, Ont. These are the first records we have from Canada.

Phasmidæ.

*Diapheromera femorata* Say. Miami, Man., July 25, 1914 (Wallis); Morden, Man., Aug., 1914, (T. South).

Acrididæ.

*Tettix hancocki* Morse. Edmonton, Alta., Aug. 19, 1913, (Walker). First Alberta record.
*Chorthippus curtipennis* Harris. Spruce Brook, Newfoundland, July 27, 1914, nymphs, (Walker).

*Gomphocerus clavatus* Thom. Prince Albert, Sask., June 23-26, 1913, (Walker). The most northerly record for this species.

*Podisma glacialis* var. *variegata* Scudd. Guelph Jct., in a swamp, Sept. 29, (Caesar). Most southern record in Ontario. Dr. E. M. Walker has taken it at Lake Simcoe, Ont., and at points farther north and west.

*Melanoplus bruneri* Scudd. Aweme, Man., Aug. 26-27, (Criddle).

*Melanoplus fasciatus* Walk. Aweme, Man., Sept. 9, 17, (Criddle).

*Melanoplus infantilis* Scudd. Aweme, Man., Aug. 11, 16, (Criddle).

*Melanoplus packardii.* Fort William, Ont., Aug. 2, 1910, (Walker).

Locustidæ.

*Scudderia pistillata* Brunn. Edmonton, Alta., Aug. 19, 1913, (Walker).

*Scudderia furcata* Brunn. Kaslo, B.C., Sept. 22, 1906, (Cockle).

* *Scudderia curvicauda borealis* Rehn & Hebard. Aweme, Man., Aug. 19, 1909, (Criddle); Trans. Amer. Ent. Soc. XL, 281, Dec., 1914.

*Orchelimum manitobense* E. Walk. Go-Home Bay, Ont., July 23, 1907, July 24-30, 1908 (Walker). First Ontario records.

*Xiphidion ensiferum* Scudd. Near Rondeau Park, Kent Co., Ont., Sept. 15, 1899, (Walker). A single long-winged female. First Canadian record.

*Tropidischia xanthostoma* Scudd. Departure Bay, Vancouver Island, B.C., July, 1908, (A. G. Huntsman). First Canadian record.

*Diestrammena marmorata* De Haan. Guelph, Ont., July 24, 1906, (Collector unknown). An introduced species from Japan, probably taken in a greenhouse.

*Ceuthophilus maculatus* Say. Winnipeg, Man., Oct. 2, 1911, (Wallis). First Manitoba record.

Gryllidæ.

*Œcanthus nigricornis quadripunctatus* Beut. Okanagan Landing, B.C., Aug. 16, 1913, (Walker). First British Columbia record.

## Odonata.

Agrionidæ.

*Agrion maculatum* Say. Sydney, N.S., July 24, 1914, (Walker). First record from Nova Scotia.

Cœnagrionidæ.

*Cœnagrion interrogatum* Selys. Nipigon, Ont., June, 1913; Spruce Brook, Nfld., July 27, 29, 1914, (Walker). First records from Ontario and Newfoundland.

*Ischnura verticalis* Say. Picton, N.S., July 22, 1914; Sydney, N.S., July 24, 1914; Spruce Brook, Nfld., July 29, 1914, (Walker). First records from Nova Scotia and Newfoundland.

*Enallagma hageni* Selys. Sydney, N.S., July 24, 1914.

Aeshnidæ.

*Ophiogomphus severus* Hag. Saskatoon, Sask., June 24, July 14, 1914, (Willing).

*Gomphus notatus* Rambur. Lake Timiskaming, Ont., July 7, 1914, two females with exuviæ, freshly emerged. (C. W. Nash.) First Ontario record.

*Aeshna tuberculifera* E. Walk. De Grassi Point, Lake Simcoe, Ont., Sept. 10, 1914 (Walker).

*Aeshna umbrosa* E. Walk. Spruce Brook, Nfld., July 27, 1914, nymph, (Walker). First Newfoundland record.

*Anax junius* Drury. Saskatoon, Sask., Aug. 30, 1914, (Willing); Buffalo Lake, May 30, 1914 (Johnson). First Saskatchewan records.

Libellulidæ.

*Pantala flavescens* Fab. Husavick, Man., Aug. 6, 1914, (Wallis). First Canadian record.

## Neuropteroid Insects (Except Odonata).

(Arranged according to a Catalogue of the Neuropteroid Insects (except Odonata) of the United States, by Nathan Banks; American Entomological Society, 1907. The numbers refer to the pages of the catalogue.)

### Neuroptera.

Hemerobiidæ.

24. *Hemerobius conjunctus* Fitch. Magpie, Que., July 19, (Walker).
25. *Psectra diptera* Burm. Toronto, Aug. 10, (Walker). First Canadian record.

Chrysopidæ.

27. *Chrysopa chi* Fitch. Pictou, N.S., July 22, (Walker).
27. *Chrysopa nigricornis* Burm. De Grassi Point, Ont., Aug. 24, (Walker).
28. *Chrysopa rufilabris* Burm. Toronto, July 14, (Walker).

Coniopterygidæ.

29. *Conwentzia hageni* Banks. Toronto, Aug. 31, (Walker). First Canadian record.

### Trichoptera.

Limnephilidæ.

* *Limnephilus æqualis* Banks. Bon Accord, B.C., June 7, (Russell); Can. Ent. XLVI, 150.

* *Limnephilus argenteus* Banks. Nepigon, Ont., June 18, (Walker); Can. Ent., XLVI., 152.

* *Limnephilus secludens* Banks. Penticton, B.C., Aug. 9, (Wallis), and Saskatchewan, July; Can. Ent., XLVI, 152.

* *Anisogamus disjunctus* Banks. Bon Accord, B.C., May and June, (Russell); Can. Ent., XLVI, 156.

* *Stenophylax hesperus* Banks. Departure Bay, B.C., Aug. 1. (Walker); Can. Ent., XLVI, 152.

Rhyacophilidæ.

* *Glossosoma penitus* Banks. Peachland, B.C., July 21, (Wallis); Can. Ent., XLVI, 202.

* *Rhyacophila bipartita* Banks. Banff, Alta., Aug. 30, (Sanson); Can. Ent., XLVI, 201.

* *Rhyacophila bifila* Banks. Vernon, B.C., Aug. (Bryant); Can. Ent., XLVI, 201.

Leptoceridæ.

* *Leptocerus futilis* Banks. Go-Home Bay, Ont., July 11, (Walker); Can. Ent., XLVI, 264.

* *Leptocerus retactus* Banks. Muskoka River, Ont., June 30, and Go-Home Bay, Ont., Aug. 8, (Walker).

* *Leptocerus angustus* Banks. Go-Home Bay, Ont., Aug. 1, (Walker); Can. Ent., XLVI, 263.

* *Molanna flavicornis* Banks. Husavick, Man., July, and Winnipeg, Man., May, (Wallis); Can. Ent., XLVI, 261.

* *Œcetina interjecta* Banks. Go-Home Bay, Ont., Aug. 23, (Walker); Can. Ent., XLVI, 262.

Hydropsychidæ.

* *Hydropsyche slossonæ* var. *recurvata* Banks. Go-Home Bay, Ont., (Walker); Can. Ent. XLVI., 253.

* *Holocentropus longus* Banks. Digby, N.S., June, (Russell); Can. Ent. XLVI, 258.

## Siphonaptera.

The following species were determined by the Hon. N. Charles Rothschild:

*Ceratophyllus wagneri.* Aweme, Man., Oct. 9, 1913, on *Evotomys gapperi,* (Criddle).

*Certophyllus gallinæ.* Aweme, Man., Sept. 26, 1913, from nest of *Asio willsonianus,* also from *Evotomys gapperi,* (Criddle).

*Ceratophyllus vison.* Ste. Anne de Bellevue, Que., on red squirrel, (Swaine).

*Ctenophthalmus pseudargyretes.* Aweme, Man., Oct. 19, 1913, on *Evotomys gapperi,* (Criddle).

*Leptopsylla selenis.* Aweme, Man., Oct. 19, 1913, on *Evotomys gapperi,* (Criddle).

*Hystrichopsylla americana.* Aweme, Man., Oct. 19, 1913, (Criddle). Mr. Rothschild, when reporting upon this species said: "It is a rare species which is only (as far as I know) represented in the Smithsonian Institution and, by one example, in my own collection."

## Acarina.

*Tetranychus pilosus* C. and F. Vineland, Ont., on plum, (Ross); Prof. Caesar informs me that the species is common in Ontario. Specimens were determined by Dr. Banks.

*Tetranychus bicolor* Banks. Vineland, Ont., on *Quercus,* (Ross).

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# ANNUAL REPORTS

OF THE

# DAIRYMEN'S ASSOCIATIONS

OF THE

# PROVINCE OF ONTARIO

# 1914

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

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*To His Honour* Sir John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

*Lieutenant-Governor of the Province of Ontario.*

May it Please Your Honour:

The undersigned beg to present for the consideration of Your Honour the Report of the Dairymen's Association of Eastern Ontario for 1914 and the Report of the Dairymen's Association of Western Ontario for 1914.

Respectfully submitted.

JAMES S. DUFF,

*Minister of Agriculture.*

Toronto, 1915.

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# DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO.

## OFFICERS FOR 1915.

*President*—J. A. SANDERSON, Oxford Station.
*First Vice-President*—J. N. STONE, Norham.
*Second Vice-President*—R. G. LEGGATT, Newboro.
*Third Vice-President*—JOSEPH MCGRATH, Mount Chesney.
*Secretary*—T. A. THOMPSON, Almonte.
*Treasuere*—JAS. R. ANDERSON, Mountain View.

*Directors*:

| | |
|---|---|
| Ontario, Durham, Victoria and Haliburton | H. GLENDINNING, Manilla. |
| Peterboro | G. A. GILLESPIE, Peterboro. |
| North Hastings | C. H. THOMPSON, Madoc. |
| South Hastings | WILLETT FARLEY, Cannifton. |
| Northumberland | J. NELSON STONE, Norham. |
| Prince Edward | T. G. WRIGHT, Picton. |
| Lennox and Addington | JNO. FORRESTER, Bath. |
| Frontenac | JOSEPH MCGRATH, Mount Chesney. |
| Leeds | R. G. LEGGETT, Newboro. |
| Dundas | J. A. CAMPBELL, Ormond. |
| Glengarry | CAPT. JNO. GILLIES, Alexandria. |
| Prescott | NEIL FRASER, Vankleek Hill. |
| Stormont | WM. BROWN, Dickinson's Landing. |
| Russell | W. H. OLMSTEAD, Bear Brook. |
| Renfrew | J. B. FERGUSON, Renfrew. |
| Lanark | JNO. STEELE, Almonte. |
| Carleton | FRED. DILWORTH, North Gower. |
| Grenville | JAS. A. SANDERSON, Oxford Station. |

G. G. PUBLOW, Chief Dairy Instructor, Kingston.
L. A. ZUFELT, Superintendent, Eastern Dairy School, Kingston.
*Auditors*, MORDEN BIRD, J. W. HYATT (deceased).
*Representative to the Canadian National Exhibition*: HENRY GLENDINNING, Manilla.

## FINANCIAL STATEMENT FOR 1914.

*Receipts.*

| | |
|---|---|
| Jan. 6—Cash on hand from previous year | $1,040 42 |
| " 17—Cornwall grant | 300 00 |
| " 17—Members' fees | 163 00 |
| Feb. 17—Receipts, programme advertising | 215 00 |
| May 2—Legislative grant | 2,500 00 |
| " 2—Received from prosecutions | 525 00 |
| " 2—Received, dairy exhibit, donations | 1,969 66 |
| Jan. 2—Interest, Standard Bank, 1914 | 19 40 |
| | $6,732 48 |

*Expenditures.*

| | |
|---|---|
| Jan. 8—Cornwall pay sheet, Directors, other expenses | $546 00 |
| Mar. 18—Pay sheet No. 2, Kingston | 126 90 |
| Sept. 8—Pay sheet No. 3, Toronto | 197 35 |
| " 8—Prosecutors' expenses. | 106 90 |
| " 8—Prosecutors' salary | 500 00 |
| " 8—Lecturers' expenses | 440 55 |
| " 8—Advertising and printing | 511 02 |
| " 8—Official stenographer | 60 00 |
| " 8—Rural Publishing Co., subs. to "Farm and Dairy" | 159 60 |
| " 8—District meeting expenses | 149 50 |
| " 8—Stationery, stamps, telephone, express | 46 70 |
| " 8—Officers' salary | 600 00 |
| " 8—Expenses from Dairy Exhibit | 2,675 42 |
| Balance on hand | 382 54 |
| | $6,732 48 |

# DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

## OFFICERS FOR 1915.

*President*—ROBERT MYRICK, Springford, Ont.
*First Vice-President*—JAMES BRISTOW, St. Thomas, Ont.
*Second Vice-President*—R. W. STRATTON, Guelph, Ont.
*Third Vice-President*—WM. BOTHWELL, Hickson, Ont.
*Secretary-Treasurer*—FRANK HERNS, London, Ont.

*Directors*:

J. N. PAGET, Canboro, Ont.
T. BALLANTYNE, Stratford, Ont.
J. H. SCOTT, Exeter, Ont.
JAS. DONALDSON, Atwood.
J. MACHOOVER, Burgessville.
GEO. E. BOOTH, Ingersoll.

*Auditors*:

J. A. NELLES, London, Ont.
J. C. HEGLER, Ingersoll, Ont.

*Representatives*:

*Canadian National Exhibition, Toronto*: FRANK HERNS, London; ROBT. JOHNSTON, Woodstock.
*Western Fair, London*: FRANK HERNS, London; JNO. BRODIE, Mapleton.

## FINANCIAL STATEMENT FOR THE YEAR ENDING DECEMBER 31ST, 1914.

| RECEIPTS. | | EXPENDITURE. | |
|---|---|---|---|
| Cash on hand from previous year | $318 67 | Cash paid for prizes: cheese and butter, $418.00; Dairy Herd Competition, $52.00; Special Canadian Salt Co., $50.00 | $520 00 |
| Members' fees—320 at $1.00 | 320 00 | Expenses for Convention | 127 09 |
| Legislative grant | 2,000 00 | Stenographer's salary, $337.50; | |
| Money received from prosecutions | 90 00 | Director's expenses, $117.50. | 490 65 |
| Donations for special prizes | 50 00 | Postage and stationery, $138.23; printing, $195.26; | |
| Sale of dairy exhibit | 1,892 26 | advertising, $104.71 | 438 20 |
| Advertising in Convention programme | 150 00 | Judges' fees and expenses, $33.60; Lecturers' expenses, $2.00 | 35 60 |
| Sale of demonstration butter | 65 84 | Prosecutor's salary, $210.00 | |
| Miscellaneous | 5 79 | expenses, $25.45 | 235 45 |
| | | Periodicals for members | 220 25 |
| | | Cost of reporting | 75 00 |
| | | Purchase of dairy exhibits | 1,892 26 |
| | | Office expenses, light, cleaning and sundries | 119 44 |
| | | Office furniture, $42.13; office rent, $120.00 | 162 13 |
| | | Telegrams and telephone, $50.01; express and cold storage charges, $26.62 | 76 63 |
| | | Half fine paid to factories | 45 00 |
| | | Auditor's fees | 13 00 |
| | | Refund to members | 2 00 |
| | | Total | $4,452 70 |
| | | Balance | 439 86 |
| Total | $4,892 56 | | $4,892 56 |

# Dairymen's Association of Eastern Ontario

The Thirty-eighth Annual Convention of the Dairymen's Association of Eastern Ontario, was held in the Opera House, Peterboro, on the 6th and 7th of January, 1915.

James A. Sanderson, Oxford Station, President of the Association, occupied the Chair.

## PRESIDENT'S ADDRESS.

James A. Sanderson, Oxford Station.

It is a pleasure for me, as President of the Dairymen's Association of Eastern Ontario, to welcome you to the Thirty-eighth Annual Convention of this Association, and to the City of Peterboro', whose citizens are so justly proud of the historic association of this city and vicinity with the dairy industry. It is not too much to say that the Peterboro' District has been and is an important factor in winning and maintaining the proud position our dairy products occupy in the markets of the world. Our Association has had the loyal support and influence of some of the best citizens of this city, and I venture to express the hope that our meetings in this city will be of mutual benefit to its citizens, to the association, and to the Dairy Industry as a whole.

It is gratifying to be able to state that the District Dairy Meetings, one phase of Dairy Education being carried on by the Provincial Department of Agriculture in co-operation with our Association, were more largely attended than any previous season. The producers showed a keen interest in a larger production, in furnishing a more sanitary milk supply, and in making the business more remunerative to themselves and to the country at large.

For some few years past we have been forced to report each year a decrease in exports of cheese from that of the previous year. Nineteen fourteen is no exception in this respect. However, while the decrease in exports from 1912 to 1913 was about 9 per cent., the decrease from 1913 to 1914 is only about 5.5 per cent. But we must not lose sight of the fact that the average selling price of cheese during 1914 was about one cent per pound greater than that of 1913. When this increase in selling price is taken into consideration, our cash receipts from exports will be very little under that of 1913.

It is a fact well known to dairymen of Eastern Ontario that our creamery business has for some years past shown a healthy, steady growth. During the past season three more creameries have been in operation in Eastern Ontario than in 1913. In addition to this several factories, equipped for the manufacture of both cheese and butter, are increasing their make of butter each year. The butter produced in Eastern Ontario is practically all consumed in Ontario, consequently statistics relating to exports of butter have little bearing on our creamery business. Nevertheless, considering the question from a national standpoint, it is gratifying to know that while our exports of butter were nothing for some years previous to 1912, they were 70 packages in 1912, 1,728 packages in 1913 and 7,300 packages in 1914.

Turning to the city milk and ice cream phases of the industry, we find these branches have been developing rapidly, which naturally accounts for a large part of the decrease in our cheese production.

The thanks of the dairymen are due to the Departments of Agriculture, both Provincial and Federal, for the splendid and efficient services being rendered in the different lines of educational work being carried on by these two departments. In this respect I would mention particularly the dairy instruction carried on by the Provincial Department, and the herd improvement work carried on by the Federal Department.

In concluding my address, I wish to emphasize the necessity of the dairymen realizing the critical condition of our own and our Motherland and the great need of using our best efforts, not only to maintain, but to increase our great national industry—dairying. We must all realize that the British Empire, of which we form no mean part, is engaged in a life and death struggle. We can and are rendering valuable aid by sending men to engage in this struggle, but those of us who remain at home can and must render equally valuable aid by increasing our supply of food stuffs for export to the home land.

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## *COMMITTEES.*

The following Committees were then appointed:—

Nominating Committee.—R. G. Leggett, Newboro; Neil Fraser, Vankleek Hill; Fred Dillworth, North Gower; G. A. Gillespie, Peterboro; T. W. Wright, Picton.

Resolutions Committee.—Nelson Stone, T. H. Thompson, J. B. Ferguson, John Gillies, Joseph McGrath.

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## THE CARE AND PRODUCTION OF MILK AND CREAM.

(Discussion lead by G. G. Publow, Chief Instructor.)

So far as I can see, the weakest point in connection with the production of milk and cream lies with the farmer. Some farmers fail to provide their cattle with abundance of suitable feed throughout the entire season. If we will note what the cows do in the month of June, when they have plenty of grass, we will be satisfied with the results, but in the months of August or September, when the grass is short, we see the supply falling off, and we try to blame the cows, when really it is our own fault. Are we giving the cows a fair chance? I do not care how well a cow is bred, or what capacity she has, if you do not give her the material to make the milk out of she will not give it to you. I am strongly of the opinion that 80 per cent. of the cows in this country are capable of doubling their yield if they were given a fair chance. You must give them a fair quantity of suitable food if you want them to do their best.

The next important point is caring for the product after it is obtained. Perhaps that is the factor of the most importance as far as the quality of our product is concerned. If we are to improve the quality of our cheese and butter, it

must be made largely through the better care of the milk and cream. We are not asking the men who are already doing the proper thing to do better. We will not make improvement in that way, but it will be by getting those who are failing to do as well as the best to improve in their methods that we hope to make improvements.

We have had dairy instruction for a good many years, and dairy literature has been distributed throughout the country both by the Dominion and Provincial Departments of Agriculture, and yet we find after years of hard work that we have the same things to report as to defects in our cheese and butter. I believe that probably more than 50 per cent. of the dairymen of this Province are delivering their milk and cream in such a condition as to enable the cheese and buttermakers to produce the finest butter and cheese. I think the time has come when the men who are producing the right article should make a demand on those who are not doing so to come up to the higher standard. The men who are producing the properly cared for milk are most concerned in this matter, and if they do not make a demand on the producers of inferior milk and cream why should we be anxious about the matter? If the dairymen of this Province are to realize the greatest reward, and the reward that they are entitled to for their labour and their investment, and if they are to be leaders in this business, then they should at once make a demand on the men who are not producing the best quality of milk and cream to immediately take steps to improve their methods. Clean conditions in connection with the production of milk and cream insures longer keeping milk and cream and of a better flavor. Just so long as we have unsanitary conditions we are going to have milk of poor flavor that will not keep for any length of time. The time has come for greater action and less talk. I ask the farmers of this Province who are already doing the proper thing to make an appeal to their partners in the work to do likewise. You are the men who should see that proper conditions are brought about.

You are asked to cool the milk and cream. WHY? Is it clear to every man why he cools the milk and cream? The cooling of the milk or cream will not make it any cleaner, it simply retards the action of the organism in the milk, the quicker it is cooled the less growth takes place. These little plants in the milk require for their growth the same conditions as other plants: food, moisture, and suitable temperature. They have all these things in the milk when it comes from the cow. The rapid cooling of the milk retards their growth. The more unsanitary the conditions the more need for rapid cooling. In driving over this country, what do you find? Here is one man who has laid in a supply of ice and has a tank for cooling his milk and cream. Drive on to his neighbour, and what do you find? His milkcan on the roadside, probably not even in a covered stand: nothing whatever having been done to the milk, except to pour it into the can. You find the same thing repeated over and over again.

Mr. Jackson: How much more does the man with the ice get for his milk?

Mr. Publow: No more; and he will never get any more until he demands his rights. These are the things that we desire to bring to your attention. We want to see if we cannot adopt some method whereby we will make a vast improvement during 1915. The fact of having clean and up-to-date conditions will make the business more attractive to your sons and daughters. I like to milk cows when everything is nice and clean about the stable. How can we give the milk the proper care unless you have the equipment for that purpose? We speak of dairying as being the most important branch of agriculture. Those of you who grow

grain have a granary. You have proper equipment for taking care of every crop you grow. You must look upon milk as a crop. You are practically selling all the crops you grow through the cows, and what you get over and above the cost of production is your reward. It costs you just as much to produce the milk whether the butter sells for 20c. or 25c. per pound. Surely it is worth while taking care of the milk in such a way that you will secure the highest price for your product. What is the reason that so many men are indifferent? Do they shield themselves behind the fact that the cheese and butter makers of this country guarantee to get the market price or make good the loss? If the cheese and butter was graded and sold on its merits, what would happen the first time you sent cheese to a merchant, and he said "Second Grade"? Would you look around to find where the trouble was? I believe the reason progress has been so slow is because the cheesemakers have guaranteed to make good the loss. I believe in a cheesemaker making good for anything that is due to his neglect or lack of ability. I will leave these few points with you and ask you to discuss them.

SENATOR DERBYSHIRE: What about putting a poor can of milk into a vat of good milk, what does that mean?

MR. PUBLOW: It means a seeding of the balance of the milk with bacteria.

SENATOR DERBYSHIRE: And the result is that you make less cheese than you would have if that poor can of milk had been dumped in the whey tank.

MR. PUBLOW: Yes; it would be better to discard it; it is possible to make more cheese without it on account of the fact of the milk being tainted. You can make as many pounds of cheese out of tainted milk if you are not particular as to the quality of the cheese. The tainted milk is taken in and operated on, and, with the knowledge they have controlling ferments they reduce the moisture content of the cheese, and that means that it takes more milk to make a pound of cheese.

SENATOR DERBYSHIRE: You have got to lose either in quantity or quality?

MR. PUBLOW: Yes; you will lose in both. The cheese will not be as good as it otherwise would be. We are all anxious about these things, because they will go further than anything else to put money in the hands of the producers.

MR. STEELE: Would it be possible to have all the good milk brought to a factory put in one vat and all the poor milk in another?

MR. PUBLOW: That is not practicable in most of the factories. That would be one way in which an improvement could be made. What would you say to having the patrons of every factory pass a resolution to the effect that no milk should be taken in over a certain temperature? The cheese factory owners don't own the business; they own the plant, and they make a contract with you to do the work. You can hardly expect the Legislature to pass an Act governing this matter. The producers are most concerned in this matter, and surely after all the years of instruction the men who are doing good work should be in a position to demand better work on the part of the indifferent producers. I will venture to say that there is not a factory in this country that is taking in milk of an average temperature of 75 degrees, but is taking a good deal less milk to make a pound of cheese than the average factory, and the quality is better than the average. It is during the months of hot weather that the cheesemakers have the most trouble. We made more poor cheese in September this year than before, because it was a hot month.

MR. ANDERSON: Is milk received at any factory in this section on the temperature test?

MR. PUBLOW: Yes; three factories did that last season.

MR. ANDERSON: What was the temperature they demanded?

MR. PUBLOW: Seventy-five degrees for the mixed milk.

MR. ANDERSON: Don't you think that is rather high?

MR. PUBLOW: Probably it is, but it is a good start.

MR. BROWN: I have found that where the milk is delivered at 70 the maker has no trouble, and immediately you go over that, and the higher you go, his troubles are increased.

MR. PUBLOW: If we can get it down to 75, I think the cheesemakers would feel happy. What would happen if the cheesemakers said: "We want a cent a pound more for making cheese in July and August; would you give it to them? No. But, so far as the reward you are getting for your labour in these hot months is concerned, it amounts to the same thing. It is taking 13½ pounds of milk to make a pound of cheese, and you are accepting that. How long is that going to continue? If we are going to reap the results that we expect as a result of these "INCREASED PRODUCTION" meetings we must try to improve our methods.

And if the quality is finer we will receive better prices, and the product will be consumed as fast as it is put on the market. If all the people were doing as well as the best, 90 per cent. of our difficulties would be eliminated.

MR. GRISDALE: What was the percentage of increase in the supply of butter last year?

MR. PUBLOW: About 10 per cent. for the months of April, May and June.

MR. GRISDALE: It evidently does not take very much to knock out the market.

MR. PUBLOW: No, because all our butter is practically consumed locally.

MR. SINGLETON: The amount of dairy butter made last spring was nearly double that of the year before, and that is what made all the trouble.

MR. PUBLOW: The butter was not good enough to ship to the foreign markets. The time may come when we will have competition from the Western Provinces in butter, and the creamery men should sit up and take notice if they want to continue in the business. Don't be satisfied until you are making as good as the best. Pay the men well for doing their work and encourage them to do better. So long as you pay them as little as you can you are not going to get the best work.

GEO. LEGGETT: I had more trouble twenty years ago in one small factory than I had in 27 factories last year. This past year I turned over 30,000 boxes of cheese and did not have any trouble, but twenty years ago we had a great deal of trouble. I think we have had a good deal of benefit from the instruction we have received from Mr. Publow and his assistants, and we cannot say that we have not made improvement, for we are making steady improvement. (Applause.)

MR. PUBLOW: I am delighted to know that Mr. Leggett's factories have done so well. If the best of the cheese from his factories were sold for what they are worth we would have a different story. The buyers bought all the cheese at practically the same price, did they sell them all at the same price?

SENATOR DERBYSHIRE: Yes, practically.

MR. PUBLOW: They have an expert in every warehouse in Montreal whose duty it is to select the best cheese. When an order comes in for so many of "Brockville Finest," they are sent from a factory that is known to make the best cheese. The cry from one end of this country to the other: is "Give us more of the finest." Some of the Montreal merchants are glad to get second grade, because they cannot get enough of the finest. I am glad that each year makes it harder to get second grade cheese. The dairy farmers of this country are losing millions of dollars as the result of second grade cheese being put on the market.

Mr. Gillespie: Is the separating work well done, and do the separators all do good work?

Mr. Publow: No, they are not all working well. You should prove to your patrons that the work is not well done; you can do so by having a sample of the skim milk sent in. It is in the interest of the factoryman to see that the patrons are skimming as close as possible. If matters continue as they are in connection with cattle breeding in this country, you will see a good many farmers dissatisfied with creamery work. This year we found a good many herds testing below 3 per cent., and some as low as 2.8 per cent., and one herd tested as low as 2.6 per cent.

Mr. Gillespie: What would that farmer get at the creamery?

Mr. Publow: If he was pooling at the cheese factory, he would get as much as the other fellow.

Mr. Gillespie: Should he get as much as the other fellow?

Mr. Publow: No, he should not. How can you build up a herd unless you know what you have got to start with?

Mr. G. H. Barr: This is a very important subject. I do not think we will ever make much improvement until we adopt a system of paying for good work. At our Finch factory we decided a year ago that we would pay according to the quality of the milk. Some of our patrons left the factory on that account. Last spring the thing became so acute that we received a petition signed by about half our patrons asking us to pay for the milk in the old way. We made the proposition that we would make cheese in two ways, we would take in the milk at one window and pay for it according to quantity, and at the other window pay for it according to the Babcock test. No fault was found with that, and the day we started to take in the milk everybody put in their milk at the pooling window, and we had to go on in the old way, but I do not think we ever got better milk than we did this year. We never had our patrons so interested in the percentage of fat in the milk. They brought samples to have them tested, and they wondered why it was that some cows only tested 2.5 per cent., 2.6 per cent., and others 4 per cent. I believe we will never get improvement in the quality of our cheese and butter until we get the farmers thinking along these lines. Just as soon as you get a farmer thinking about the percentage of fat in his cows' milk, then you get him trying to improve his herd, and when you get him thinking in that way he begins to be a better dairyman. Until we begin to pay for the milk according to quality we will never make the improvement that we should.

I do not believe that we are going to increase the production of milk in this country as much as we should and as much as we can until we get milking machines. You will find the best farmers not able to carry as big a herd as they would like to on account of the labor question. I am hoping that before long we will have milking machines that can be installed in stables of ten cows at a reasonable price. I agree with Mr. Publow that if we had fewer cows and fed them to better advantage we would be making more money. Just so long as we continue to pay the same price for sour cream that we pay for sweet cream we will continue to receive sour cream at the creamery. Nothing will do more to save the reputation of the Province of Ontario for butter and cheese like paying for milk and cream on its merits. We had to take less money for our butter the past year, simply because we were importing New Zealand and Alberta butter, which is better than the butter we are making in Ontario. Why? Because over 90 per cent. of the cream delivered at the creameries in Alberta this year was graded. We were told at Guelph that three or four creameries at Toronto were grading

cream, but a smile passed over the audience when that statement was made. How can you expect the patrons to do better when all the cream is paid for in the same way without regard to quality?

SENATOR DERBYSHIRE: The strongest point that has been brought out at this session is the fact that you are paying the same price for a poor can of milk that you pay for a good can of milk.

MR. PUBLOW: Everybody knows that a can of gassy milk will spoil seven or eight cheese to a certain extent.

MR. G. H. BARR: At our factory at Finch we received 1-16 and ⅛ more than anybody else in the district, and more than the ordinary price paid for cheese, because we had good cheese. We hardly ever have a vat of gassy milk; we had a cool curing room and that is worth a great deal to any factory. I do not believe that every factory can afford to have a cool-curing room and the factory equipment that we have at the price of cheese to-day. I do not know that we have made any money out of the Finch factory as yet. The ordinary factory owner is up against it if he wants to have everything the way he would like to have it. We can pay our patrons more money than our neighbours.

MR. SMITH: How is it that you cannot make the factory pay?

MR. G. H. BARR: We are doing experimental work all the time. We have found that fat plus 2 came nearer the actual amount of cheese we got than straight fat. I have a chart, with a great many figures on that I will put up in the hall, showing the different experiments we have been conducting.

MR. GILLESPIE: Don't you think adding 2 spoils the system of paying?

MR. BARR: Yes, because the ordinary farmer does not understand it. I am going to work at that matter until I am satisfied as to what is right. I can show you four ways of paying for milk that any bookkeeper can use. In some districts there are only one or two men capable of testing the milk and that is a serious handicap, but it does not alter the fact that the proper way to pay is by the test.

MR. RENWICK: When the Babcock test was first introduced in this country the farmer was pretty well satisfied, but when we started to figure out the fine points and add 2, the farmer said: "If the test is not right, why add 2?" and in a great many cases it was dropped because they were working with something that they did not understand.

MR. BARR: I am quite willing to admit that that has been the case, and it has been the cause of a lot of dissatisfaction. We have more information on the point to-day than we ever had before. If we can make more cheese out of 4 per cent. milk than we can from 3 per cent. milk, why not pay for it accordingly?

MR. RENWICK: I believe it is the only way to pay for milk at a cheese factory.

MR. BARR: Any of these systems is better than paying for the milk under the pooling system.

MR. GILLESPIE: Twenty-five per cent. of the separators are not doing good work. I am not speaking of any particular machine.

MR. PUBLOW: There is no doubt you have got to run the machine properly in order to get the best results.

MR. GILLESPIE: Are the farmers doing that?

MR. PUBLOW: I am not in a position to say whether they are or not. That is a weakness in connection with creamery instruction work. There are so many things in connection with running a separator that may cause a loss. I think one of the greatest difficulties is lack of uniformity of speed. I think it would be well if the manufacturers of separators could get something on the machine to regulate the speed.

Mr. Gillespie: If the farmer loses fat in the skim milk he cannot get paid for it at the factory.

Mr. Publow: I think we could do something for the farmers if they would send in samples of their skim milk. Some machines are not kept clean enough to do good work. Instructions are sent out with the machines, but the farmers do not always live up to the instructions.

Mr. Glendenning: How are you going to get a uniform speed?

Mr. Publow: I think it is more important to have a speedometer on a cream separator than on an automobile. The machine will not affect the richness of the milk. It will not give you any more cream than there is in the milk, but in order to get all the cream that there is in the milk the machine must be run in a proper way.

Mr. Gillespie: What about the condition and care of milk for city delivery?

Mr. Publow: There is no reason why it should be taken care of any differently than for the manufacture of butter and cheese. It is in the best possible condition when it comes from the cow.

Mr. Clark: Is there any difference in the quality of the milk when a milking machine is used?

Mr. Publow: A milking machine is all right if you have the right man to use it. We have had very bad milk as the result of the milking machine not being properly cleaned. The quicker milk is cooled for city supply the better. It is necessary to cool it lower for city trade than for the factory.

Mr. Gillespie: Do you use a strainer with a sanitary filter?

Mr. Barr: Not on the farm. It is worse than nothing if you don't keep it absolutely clean.

Mr. Publow: Have you ever tried flannel cloth?

Mr. Barr: Yes. That is better than cheese cloth. I am always dubious about recommending anything in the cloth line.

Mr. Publow: If they would only use the batten once and then throw it away they would get the cleanest milk. They find the fine particles are taken out in that way. Milk should be kept covered up at a low temperature. The time will come when all the milk used in cities and towns will be pasteurized. It will be no better as a food product, but it will keep longer in desirable condition.

Mr. Thompson: I have a copy of the rules and regulations governing the supply of milk in the city of Montreal. The stables are all inspected and they have to come up to a certain standard. The cow's udders have to be brushed. What would be your opinion of having an inspector to examine the condition of stables and cows where milk is supplied to cheese factories?

Mr. Publow: I think it would have a very beneficial effect. We have got to improve our sanitary conditions. Mr. Thompson's suggestion is a splendid one if it could be put into practice. There is no reason why milk should be any better for household use than for making cheese, and yet farmers when they supply milk for city use have to comply with the regulations. If all the conditions were as good as the best and the same care was given in cooling and cleanliness, I will venture my reputation as a cheesemaker that throughout Ontario it would take half a pound less milk to make a pound of cheese than it does at the present time.

Senator Derbyshire: And they would get more money than they have ever got for the product.

Mr. Publow: Half a pound less milk to make a pound of cheese; what would that mean? It would mean a very great deal to the farmers of Eastern Ontario, and it can be done if proper methods are adopted.

Mr. Thompson: I think one of the strongest arguments in favor of inspection is that the farmers are not deterred from sending their milk to the city, they are going in for it stronger than ever. I think something should be done at this meeting along that line. The farmers want to get the very most out of their milk.

J. R. Dargavel, M.P.P.: I had something to do with the Milk Commission, particularly with regard to the supply of milk for cities and towns. After that Commission made its report, legislation was obtained which enabled cities and towns to pass laws regarding the inspection of dairies supplying milk to cities and towns. A great many people have asked: "Why didn't you get the same power regarding the supply of milk to cheese factories?" The answer is the patrons have it all in their own hands. If they prefer to go on in the old way, why should not they be permitted to do so? You cannot by legislation protect a man against himself. The patrons of a cheese factory are a law unto themselves, and if they choose to let things go on in the old way and supply any kind of milk that will pass the nose of the cheesemaker, they are at liberty to do so. On the other hand, if they meet together and pass regulations as to the temperature of the milk, and regulations as to the inspection of stables, it is all within themselves. It is just a question of whether they prefer to go on losing money year after year, and not only losing money but to a certain extent losing the reputation that we have for our cheese; if they prefer to do that then we must put up with it. The people of this country have the power to regulate all these things. This Association secured legislation empowering them to inspect cheese factories, and Mr. Publow can go out at any time and close up a cheese factory if they won't comply with the regulations. I would be very glad if it could be pointed out to me as to any legislation that can be enacted that will improve conditions as they exist to-day. Personally, I cannot see where the legislation that we now have can be improved upon. I think we have all the power that we should have; the trouble is that we are not using the power that we now have. Who is to blame? Nobody but ourselves. We could have had the same conditions for milk sent to cheese factories as for milk for city trade. The reason the farmers put up with the conditions imposed on them with regard to supplying milk for city trade is because they know they are going to get a little more money for the milk. If we can bring home to the farmers that they will get a little more money by complying with certain regulations, and if it can be plainly shown that they are losing money by sending the milk to the factory in poor condition, then we should soon be able to make improvement. That is one of the things that we should look to in the future and show the farmers and prove to them beyond a doubt that by adopting clean and up-to-date methods they will be able to get more money for their milk, and I do not think we should have any trouble in securing a great betterment in the milk supply. (Applause.)

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## PROGRESS IN COW TESTING.

C. F. Whitley, Department of Agriculture, Ottawa.

For report of Mr. Whitley's address, see report of Dairymen's Association of Western Ontario, under this cover.

## SOME OF THE FACTORS WHICH INFLUENCE PROFITS IN DAIRYING.

J. H. Grisdale, Director, Dominion Experimental Farm, Ottawa.

Thinking makes for progress in agriculture, even more than in any other business. We have millions of farmers in Canada, and only thousands of them think as they should. They restrict their thinking to very local conditions, and they are not able to apply information that is available. They all take papers and there is not a paper in Canada that does not deal more or less with agricultural matters. As farmers we are content to go on in the old "Come-a-day-go-a-day-the-Lord-sends-Sunday" way. Until we awaken from that condition of lethargy and are inspired to do better, I think the prospects for agriculture are poor indeed. We have at the present time a more poignant argument than at any other time in favor of progress. We are to-day in the midst of a war such as the world has never seen. We are a part of an Empire, than which no greater exists, and that Empire is in this war, body and soul, and with every energy it can put forth. We are part of that great Empire and we must be up and doing, and do our part in the great struggle which is under way. Our part is not merely to send more men to the front, but in addition to that we must raise more grain and produce food materials to feed the great army of the Empire. There are no fields the world over more fertile than ours. Our farms are almost unlimited. We could next year, without difficulty, increase our output 50 per cent. I hope every farmer in the Dominion will do his level best, and also inflence his neighbour to do better. The production of food is one of the most critical things in sight to-day, and if we Canadians don't rise to our opportunity and to our duty we shall be falling far short of what is patriotic.

I want to talk to-day on some features of dairying that are known to almost all of you, but which are very seldom recognized and applied, and I want to talk about some of the factors which influence profits. That profits vary greatly, you will have seen from the table Mr. Whitley has shown you. What makes for this great difference in profit? Mr. Whitley would say, "Why, the amount of milk produced." True enough, the amount of milk produced influences the profit and is one of the principal factors, but we as farmers are the people to control the milk. There are various ways in which that can be done. In the first place we can breed better cows. Another way is by providing good housing. I want to emphasize the importance of having a good, comfortable, well lighted and ventilated, hygienic building in which to keep your cattle. Do not think for a moment that because a building must have all these high sounding qualities that it must be an expensive building. I have seen some of the most undesirable barns that cost twice as much to build as a good barn that possessed all these qualities. It was a poor barn because it was badly lighted and ventilated; small where it ought to have been roomy, and spacious where there was no necessity, possessing the greatest combination of things that ought to be avoided. Build your barn cheaply, but build it scientifically. Give your cattle plenty of light; for glass is not expensive. Give your cattle plenty of air; the air is as pure to-day as it was a thousand years ago, and just as easily introduced into your stables, and will do your cattle more good than five pounds of meal per day. Give them roomy quarters; do not cramp the passage behind them, and give them a high ceiling. The number of cubic feet per cow is an important matter. Such a stable need not

cost any more than the worst equipped stable in these respects that you ever saw. A stable that will be warmer than most stables can be built with two-ply boards and a good paper. Such a stable will cost you somewhere in the neighbourhood of $150 per cow, and if you can figure up a cheaper stable than that I would just like to hear how you can do it. We have built a number of stables recently, and we find that a stable built in this way will stand the coldest weather and the warmest. Of course, if you have plenty of light coming from the south, you must have shades in the summer in order to keep the temperature down. It is in the winter time that we have the greatest difficulty in maintaining the health of our animals, and it is absolutely necessary that we should provide stables that will insure good health. If we have proper conditions for our animals, they will respond to the food that we give them.

The next great consideration is feeding them cheaply. In my estimation feeding them cheaply means getting the food that we give them at the lowest cost, and that it will be of such a character as to insure the best returns. Many farmers imagine the foods to give them good returns must be expensive, and that they must feed heavily of meal. This is a mistake. I do not intend to deal with the quantity of the different feeds, but there are a few important feeds which we must consider if we hope to feed our cattle cheaply. Fortunately these feeds are the very ones that we in Eastern Canada can produce at the least cost, and if we do that we increase our profits. We can hardly over-estimate the value of economical and proper feeding. Mr. Publow said this morning that by good feeding you can double the returns of your cows. That sounded like a strong statement, and I have made that statement in an audience of farmers and have been called down instantly for exaggerating, but that is not an exaggeration. It is quite possible to double the returns not only in pounds of milk from a cow by feeding her properly, and if we take the average cows of the country, I know positively it can be done. To prove that point, we took a bunch of heifers, at one of our experimental farms some five or six years ago, that were picked up from the farmers in the neighbourhood where the cows were giving 2,000 to 3,000 pounds of milk a year. We bought the heifers from these farmers and we fed them properly, with the result that these cows averaged us, the second year in milk, something considerably over 5,000 pounds. In fact almost 6,000 pounds per cow; considerably more than double what their mothers were doing or had been doing on the farms in the immediate neighborhood. There is proof of what I say that by food feeding you can double the output. We have a similar experiment under way at one of our farms in Quebec and we get similar results. In this case we bought cows after they had dropped a couple of calves, and we were able to compare them with the average of the farmers' herds from which we got them, and we more than doubled the returns of these individual cows in comparison with the average of the herds, and these farmers were careful not to sell the best cows out of their herds. Even the poorest farmers know something about the milking qualities of their cows. Every farmer knows that one cow is better than another, and that the best cow is the one he does not want to sell. At this particular spot where our Experimental Farm is located, I had occasion to look into the records of a number of herds of cows as given by the cheese and butter manufacturers in the district, and there were herds there that had given only $12 and $13 a cow in the whole season. It seems incredible that such a thing could happen in Canada, but that happened only three years ago, and we have some of the cows from these same herds, and we have got from these same cows something over $45 worth of pro-

ducts this year, so that you see we not only doubled but trebled the output from these same cows by good feeding. The cost of the feed was not trebled, probably doubled, because a certain amount of food is necessary to keep a cow, and it is over and above that where the profit is made, but here the profits were on the positive side. No man can possibly keep a cow alive for less than $20 or $25.

What do we mean by cheap food? Cheap food is food that makes a profit, and that means abundant feeding at all times. It will not do to feed your cows cheaply during the month of June or October or September and let them get the best they can during the rest of the summer and feed them light during the winter and fall, and anticipate that they are going to go dry anyway. Cheap food means abundant food at all times, and the man who is going to attempt to lower the cost of food for his herd must keep that in mind. It may not appear reasonable that to feed cheaply you must feed heavily or abundantly at all times, but that is the case. You must also produce that feed at a low cost. To summarize the whole matter, feed abundantly at all times and have these feeds produced at the lowest cost imaginable, and that will lower the cost per unit of milk produced and increase the profits, not only per cow but relatively.

The feeds that we require are such as we have on every farm: clover hay, alfalfa hay, corn ensilage, some straw and other kinds of ensilage if you can make it more cheaply and some concentrated meals, if we can produce them on the farm, so much the better, but if we cannot, it will pay us to buy them, but it might not pay us to buy them lavishly. If we are going to feed our animals on the plan I have mentioned, we must plan to have the food in quantities and at all times. The average farmer counts on cutting the feed off from his cattle in May and not start to give them anything until late in the fall. A good farmer makes more or less preparation for supplying some forage cut green or in the form of ensilage in the summer months. In this eastern part of Canada we can only count on one or two months of decent pasture, and to undertake to have enough pasture land to carry an average herd during the summer means that practically the whole farm has to be in grass. At Ottawa we have about 200 acres of land, and we have on that farm from 150 to 175 head of cattle, and you all know that it would take every last acre that we have for pasture, if we were to undertake to feed them on pasture alone; but we produce enough forage on that land to carry these cattle the year through. We should make pasture a secondary consideration, and by doing that we can do much to provide for the cattle an abundant supply of cheap feed all summer. Pasture looks like the cheapest way of feeding cattle, but in reality it is the most expensive. I have no hesitation in saying that pasture is the dearest way of feeding cattle in this eastern part of Canada, unless you happen to have large areas of land that are practically not tillable where cattle can roam; and I am not sure that it is not the dearest way then, because a cow that has to walk a mile or two to get a bite for breakfast will use up her energy in that way instead of producing milk. All the land that is arable on a farm should be brought into cultivation in a systematic way. It should be brought under cultivation with the object in view of producing these crops I have mentioned in uniform quantities year by year, so many tons of clover hay, so many tons of alfalfa, if you can produce it, and so many tons of corn—there is hardly an acre in Eastern Ontario where corn cannot be produced—and so many tons of oats or oats and barley or oats and peas. By following a systematic plan, very much can be done to reduce the cost of production. Rotation is a word with which my name has become identified. I have been preaching crop production by means of rotation

for so many years that I am almost ashamed to talk of it any more, but if you are going to do your best to reduce the cost of food production, we must adopt a system of rotation, because there is absolutely no other way of doing it. I am convinced of that because of the results of our work at Ottawa and at the other Experimental Farms.

Some eight or ten years ago we introduced rotation on all our farms. We have some twenty-five of them now, and we find it has been a marvelous aid in lowering the cost of production. You can double the yield of your land by proper cultivation and by a proper rotation. You not only lower the cost per acre, but you increase the production per unit, and you make the profits on a given area of land simply by comparison with what they have done under the average conditions. Do you know that the average bushel of grain and the average ton of hay and the average ton of ensilage is produced in Ontario at a loss? That is a fact that has been startingly brought to my attention by following the statistics as furnished by the census. It is regrettable, but nevertheless true. It seems almost incredible, but it is a fact, and it is because we are satisfied as farmers to work for lower wages than we should receive. We are not getting anything like the returns we should. We can change this by using a little bit of good common sense, and by putting a little of the information which is lying around us into practice.

I do not care whether you follow a three, four, five or even a ten year rotation; any rotation, provided it is a plan with a little common sense, will help increase the returns and lower the cost of crop production. I do not intend to go into the pros and cons of any particular rotation. I do not care how long you make your rotation, but do not leave the land too long under hay. I have found the most profitable rotation to be a three year rotation, hoed crop, grain, and then hay. It beats every other rotation by a long way; it beats every rotation in its effect upon the soil and in its effect upon the cost of the food produced and in economy of labour. You may dispute that, but I am quite willing to show you it is true, for this reason: If you have large fields and a short rotation you can do your work much more cheaply than if you have small fields and a long rotation. There is not nearly as much turning and moving around from one part to the other and you can use larger implements, and the larger implement is the implement of the future, and it ought to be the implement of to-day. I am sorry that it is not. The two-furrow plow will enable you to do plowing at a reduction of 50 per cent. of the cost. A four-horse harrow will cut the cost of cultivation in half. We have proved that over and over again. The wide seeder will enable you to put your crop in twice as fast, and if sowing your crop on the first day of May means a better crop than sowing it on the 15th, then it is worth while on that point alone to use a larger machine. We use as large a seeder as we can. We use the largest seeder that is made, and we have found it to have such an effect in lowering the cost that we would not think of using any other; and the same with the binder, tedder and the horse rake. There are a number of machines coming on the market that we are trying, and I would not advise you to try a lot of them, because a number of them are useless, but I would not want to stand up here and indicate the machines that we have found useless. If anyone asks me about any particular machine, I would tell them whether it is profitable or not. That is one of the important functions of the Experimental Farms, to try out all these things, and we are doing the very best we can to do it. One thing that is attracting a good deal of attention in Ontario to-day is traction power on

the farm. We have tried the use of traction engines for farm operations, both in the east and the west, and I have no hesitation in saying it is not satisfactory. It is possible that some machine may be found that will prove satisfactory, but we have not such a machine to-day. We use a traction engine for plowing and it costs about 75c. an acre. You would say, "If you can plow for 75c. an acre, that is marvellous," but you have to count in addition to that the short life of the engine, and if you add to that the cost of the engine, you find it does not cost 75c., but probably $2 or $3 per acre. Horse-power will have to be depended upon as in the past.

Now, I want to give you a concrete example of the effect of these rotations upon the cost of production, and then I am through. By following proper rotation and by using large machines, in spite of the increased cost of labour at the Experimental Farms, and, as you all know, labour is more expensive there than on the average farm, because certain conditions are against us. We are near a city and it is a Government institution, and in spite of all we can do, we cannot persuade the men that they ought to work as hard and as cheaply for the Government as for anybody else. But, in spite of all these disadvantages, we have lowered the cost of growing an acre of corn or hay or grain as compared with the cost sixteen years ago. Ever since I went to the Experimental Farm I have been paying close attention to this question, and I have the exact record of growing every acre of crop and cultivating every acre of land on that farm for sixteen years.

If you take a crop of clover of three or four tons this year, and if you leave it for another year you will get a crop of a ton or a ton and a half, because the clover will all be gone, and all that is left is a little timothy. If you have an acre of corn growing on clover sod with a good manure dressing with the clover growing up through eight, ten or fifteen inches high, when it is turned under in the spring it is not eight or ten tons of corn to the acre, but eighteen or twenty, and the cost of production is lower *pro rata*. It is the same thing with your grain. If you have it on clover sod with a dressing of manure, you will not get only 20 or 25 bushels of oats, but you will get from 65 to 80 bushels of oats per acre, and you will be able to feed your cows better and keep better cows. That, of course, means more labor, and I would like to see every farm in this country giving work not only to the farmer and his sons, but work for two or three hired men. The reason we are not doing this is that we are beginners and novices and we are not up to our business, and we are not taking advantage of our opportunities and we are not doing what we ought to do.

We must waken up and inspire ourselves first and then our neighbors to do better work and more work with our heads and get more out of our land. I am safe in saying that the cows in Canada to-day are not producing half what they ought to because they are not properly fed. We are not getting from our land half that we ought to. I have had, during the last twelve months, an opportunity of visiting thousands and thousands of farmers in this Canada of ours, and it is only once in a long time that I find a farmer who is beginning to get anything out of his land worth while, in comparison with what he might be getting, and it seems to me that it is up to us, if for no other reason than patriotism, to get busy and produce the best out of our farms. (Applause.)

A MEMBER: Would we get the same price for our crops if we increased them?

MR. GRISDALE: I suppose you are referring to some remarks that were made this morning, where it was shown that if the production in certain lines were increased the returns would fall off. I do not think there is any danger of that.

I believe the moment we can make our production uniform—don't expect to produce a million pounds of cheese this year and get 12c. a pound and two million next year and get 12c.; we cannot make our markets contract and expand in that way—but if we gradually increase to two million, we will get just as good prices as we are getting to-day.

SENATOR DERBYSHIRE: And more if you make it finer.

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## BUILDING UP THE DAIRY HERD.

F. R. MALLORY, FRANKFORD.

The subject that has been given to me is: "Building up the Dairy Herd." I presume that subject was given because we possibly have had some success with our dairy herd, and if you will pardon me, I will give you the past thirty year's history of the herd which I represent.

In the year 1885, thirty years ago to-day, or to-morrow, I am not sure which, my grandfather became dissatisfied with his herd of cattle. I happen to be in the happy position that I can give you the figures because he was president of the cheese company and the old milk books are there. His herd was producing about 2,000 pounds per cow per factory season, which was considered very good in those days. The Herd consisted of brindle cows, strawberry, dun colors, etc. He had courage enough to believe there was something better, and the courage was in his mind so strongly that he went out and paid $750 for a pure bred bull, and at the same time he bought a pure-bred cow. As events transpired, it proved that he made a very good purchase when he got the bull, but he might better have given the man a thousand dollars and told him to keep the cow. You will see the point I am coming at. We have in our herd somewhere around 100 head of pure-breds, and there are in the Province of Ontario to-day somewhere in the neighborhood of 300 pure-bred Holstein cows which are giving good results that are all descendants from that one cow. Three hundred descendants in the Province of Ontario from one cow that was worse than useless thirty years ago! You will see why I wished to make the personal application. The old book shows that this cow produced 1,200 pounds of milk in the factory season. She went some, didn't she? This cow was bred along with these old brindles, dun colors, strawberries and spotted ones to this pure-bred bull, and all the calves were raised for six years. During the time my grandfather lived, he kept all the calves indiscriminately and at the end of that time he had a herd of a different color, but that is all you can say. As far as the records show there was no improvement in the milking capacity of that herd. Why? I say it with all reverence; the old gentleman was a breeder, but he was not a feeder, and he was not a weeder. He was not a cow man except from a theoretical and from a typical point of view. He picked his individuals from appearance rather than from proficiency, and let me tell you that my experience in selling cattle in Ontario to-day is this, that there are quite a few of our farmers working along the same line at the present time.

At the end of six years the old gentleman passed to the Great Beyond, and the herd was handed over to my father. It had gained by this time quite a number of females of a different color, but there had been absolutely no progress as far as the milking yield was concerned. It happened that my father was also secretary of the cheese factory and the milk books are there to tell the tale, so that the herd can be traced right down through the line.

My father handled the herd for fourteen years. That makes six years with my grandfather and fourteen with my father or twenty up to the time I took it over. During the fourteen years my father handled it, there were dozens, and I was going to say hundreds of females that went to the butcher. Pure-breds with pedigrees were sent by the dozens to the butcher. The Holsteins were not recognized as being a very high grade in those days, but nevertheless at the end of the fourteen years the books show that there was a herd there which was averaging 7,000 pounds in the last year in that factory season. There was a progress of 5,000 pounds, from 2,000 to 7,000 in the fourteen years, and that was largely caused by weeding. I do not think the feeding was much better and the results were chiefly caused by weeding. The grades and pure breds were sent to the butcher unless they came up to a certain standard. Through foresight and kindness my parents gave me a course at the Guelph Agricultural College, and about this time the Province of Ontario had developed more or less of a scientific craze. It was just about this time that we commenced to hear about scientific feeding, weeding and breeding—science in every department of the agricultural game.

We all know that the Agricultural College was not patronized very well for a good many years. We know that progress was not made as fast as it should have been for many years. When I took the herd over, I had been schooled in certain principles of feeding. What I am going to say sounds pretty big, but nevertheless it is true, that we were not only able, by feeding to double the product but to treble it in individual cases. It just happened that in that herd that was averaging 7,000 pounds per cow, there was one cow there when I took it over that was six years old, and the next year I put her in the Dominion Government records of performance. I milked her twice a day, and she gave something over 12,000 pounds that year. That was a jump from 7,000 to 12,000, and then I said "I am going to see what I can do with that cow," and the next year I milked her three times a day or over, and I got nearly 24,000 pounds in the year. Do you see the point? That stands without dispute. It is official, and I did it myself. It is not a case of doubling; it is hardly a case of trebling, but it is a case of quadrupling the record of one cow, and this was done by feeding and in an economical way.

From this herd there have been cows that have given 118 pounds of milk per day. There have been seven cows come from that herd which gave 100 pounds a day. There have been three-year olds which have reached 19,000 pounds a year and several of the cows have passed the 20,000 pound a year record. It is the only herd in the world which has produced three generations of 100 pound cows.

I very much dislike giving these facts because it sounds like blowing my own trumpet, but I have been requested to do it and I am merely giving you the facts. For thirty years I have had an opportunity of handling and being mixed with a herd of cattle which has come from the cellar to the top story, to a certain extent. The question naturally arises, "Is there any short cut to success or have we all to spend twenty or thirty years to reach something which is useful and which is economical and good and productive?" This is a much faster age than it was thirty years ago. The breeders then were not so keen for purchasing stock. We had no cow testing associations; my grandfather had no official records of performance and the Dominion Government would not keep records for him. He had practically nothing to go on except just what his eye or his mind might tell him, but to-day things are much different. If we want a good cow we can go to Mr. Whitley, or write to him and ask him where there is a herd that is giving good records. Then we can go to that herd and make purchases, and we have some kind of guarantee that we are buying something that is going to be good. We can go to

the yearly record books of the Dominion Government and we can ask what herd has proved itself to be useful, and if we want to purchase a bull we can look up these records and write to Mr. Drummond and he will be very pleased to give you all particulars. There are much shorter cuts to success now than there were when my grandfather started.

Coming back from the history of this herd of cows to the question of building up a dairy herd, there are probably as many ways of building up the dairy herd to-day as there are ways of building a house. It is a question that is up to the man on the job. It depends upon his pocket book, the size of his farm and upon his natural taste and the ideal which he has in view. If his ideal is one of production, he does not have to go into the pure breeds any more than to get a good sire. If his ideal is to become a breeder—let me say the Province of Ontario stands in an enviable position as a breeding ground for all lines of pure-bred dairy stock—if his ideal is to be a breeder, then he must go to the pure-bred herds for his stock. If we are going to select a sire to build up our herd, I would say that the time for using a scrub sire in Ontario is gone. The people have been pretty well educated to that point. You should buy a pure-bred sire. You may get one with a good ancestry, but let me tell you there are some scrubs among the pure breeds, and therefore, you must get a pure-bred with a good record. The trouble with a good many farmers in Ontario is that when they come to me or go to any other breeder, they do not grasp the significance of the records made. A man should almost be in the business for a few years to have these matters on his finger tips. There may be an individual pure-bred cow that will make an excellent record, but if she comes from nowhere, she goes nowhere; in other words, she has no ancestral records and she leaves no ancestral records, and I would rather have a cow with three generations of fair records than one individual with a large record. You are more liable to get one which will transmit good qualities by having three generations of fair records than you are by having one with a large record with poor things on either side of her. Consequently when we make a selection of a sire, we must remember these things.

We want to watch out for what Prof. H. H. Dean would call a freak, that is a cow that makes a big record, comes from nowhere and goes nowhere. We want something that will prove for three generations that it will do good work.

In selecting a sire, we should be careful to go to a breeder rather than to a man who is dealing in pure-bred cattle. When I say a breeder I mean a man who is breeding his own stock and knows what he has got, and when I say a dealer I mean a man who is going over to his neighbor and buying cattle and keeping them until next week or so and then selling them to somebody else for a little more than he paid. We have both kinds of men dealing in pure-bred stock in Ontario and some are partly breeding and partly dealing. The pure-bred business has been very good during the past few years, and there has been a boom in the live stock business, and a great many breeders are holding a lot of their best females and selling other individuals from the herd. A few are breeding only, and they are the men you should have the most confidence in. The man who is partly breeding and partly dealing may have some good females, but you should watch out and see that you get good ones when you go to him.

Coming down to the standpoint of a type of a pure-bred sire, I would be careful, above all things, to try and get a sire from cows with good udders and that were easy milkers. Time is too valuable to spend twenty minutes milking a hard milking cow to get 25 pounds of milk, when five minutes will do it on an easy milking cow. Unfortunately, sometimes a hard milking cow will make a record

and her descendants will come down through the country and you should be careful not to get one of them. Very few of us estimate the loss of minutes in milking a dairy herd. If we spend five minutes milking cow No. 1, and twenty minutes milking cow No. 2, then we have lost fifteen minutes; and if we do the same thing at night that means a half hour in the day, and if you figure that up for ten years, the life of a cow, you will see the amount of time you loose on that one cow. Prof. Dean has said that the only way to select a cow is to sit down and milk her and test her milking qualities, and after a good deal of experience I have reached the conclusion that he is almost right. We can get considerable information as to a cow's character from her appearance, yet at the same time I have proved successfully that you may have two cows that will look much alike and one of them will give you 5,000 pounds of milk a year, and the other 10,000. The usefulness of a cow as a milk producer seems to depend upon her nervous machinery or something inside of her. She is not like a beef animal, because we can poke around them and find where the fat is, but a milking cow has something in her that we cannot see. I have found that the cow that eats a large quantity of rough food is a much more economical producer than the one that consumes a lot of grain. You might bring a cow before me to-day and I could not tell you from the looks of her whether she would give you 5,000, 10,000 or 20,000 pounds of milk a year. I might make a guess at it, but I might be right or wrong. We have got to go back to the cow testing association and to the official record work, and to the actual milk pail work before we can make a selection.

In selecting a dairy cow I would be careful to get a good pedigree, and one that showed well for three generations. I would not buy one of the freak kind. I do not know any better place to go to buy a dairy cow to-day than to Mr. Whitley. One of my neighbors, Mr. Lowry, who has a grade herd, was telling me that he had doubled his product in two years by cow testing work. That truly would be a good place to go to buy something which we know would be all right. In selecting a dairy cow, we cannot exercise too much judgment. We find in our section of the country that the farmers are tempted too much to sell their best cows. Somebody comes along and offers them quite a nice big price for one of their cows and some of the farmers will take it. If he is in the cow testing work, he will realize what he has got and he will keep that cow; but if he is not in the cow testing work, he does not know how valuable his cow is and he is apt to sell it.

Supposing a farmer puts the price of a grade cow at $100 and the second best cow at $80. It might be found the first year in the cow testing work that the $100 cow gives $40 in milk and the $80 cow gives him $30. Would it not be foolish to take $100 for that cow; yet that thing is happening every day on Ontario farms. The people in Eastern Ontario are selling their best cows, and in that respect they are behind the farmers in Western Ontario, because I know the dealers in Western Ontario have come to Eastern Ontario to buy cows, and they have taken cows from our section for which they paid $60, $75 or $100, and have sold them in Western Ontario for $100, $125 and $130. That just looks to me as though we were not on to our job in Eastern Ontario when we allow some fellow to come down and buy a cow from us for $75 which he can sell in Western Ontario for $125. We want to look a little more to our business in Eastern Ontario, and be more careful in selecting our sires and dams.

I would like to advise against the crossing of strains. Supposing I have eight black Holsteins, and I say to myself, "They are too dark in color and I want to lighten them up," you would naturally get a white bull, would you not? But from my observation and experience that is a mistake, because when you put two

extremes together you get a muddle; you get a color that is not pleasant to the eye, or you get little specks or the colors run together. I would sooner get a bull that was half black and half white. The same thing is true from the record standpoint. If I have a cow that is just giving me 40 pounds of 4 per cent. milk, and I think she is not giving me milk enough, and if I have another which will give me 80 pounds of 3 per cent. milk or may be 100 pounds of 2.5 per cent. milk, I will be very careful not to cross the 40 pound cow with the high testing one or the 100 pound cow with the light testing, because there would be too much of an extreme. You are just as liable to have that 45 pound cow testing 4 per cent. reduced to 2.5 per cent. milk as you are to have the 100 pound cow produce 4 per cent milk. The point I want to make is just this: If I have a high testing herd and they are not milking to suit me, I would not try to grab at the highest mark I can get. From my experience of thirty years, I do not think it is wise to make harsh crosses, because when you put two extremes together you do not know where you are going to come out at. It is better to go a little slower and gradually work up. I do not know of anything that would illustrate it better than the suggestion that you should cross a Shorthorn with a Jersey. I think it is better to gradually work to a point than to try to jump to it.

## THE DAIRYING INDUSTRY IN SWITZERLAND.

J. A. Ruddick, Dairy Commissioner, Ottawa.

For Mr. Ruddick's address see report of the Western Dairymen's Association, under this cover.

## ADDRESSES OF WELCOME.

William Buller, Mayor of Peterboro': I am sure it is a great honour for the City of Peterboro to have delegates from all parts of the Province of Ontario with us to-day. We feel that the industry of dairying is a great one in this County of Peterboro, not only in the County of Peterboro, but in the Province of Ontario, and, in fact, in the Dominion of Canada. The cheese that is produced in Canada goes from one end of the world to the other, and we feel that it is making the name of Canada famous; and we, therefore, feel it an honour for the dairymen to be with us, and I have much pleasure in giving you the freedom of this city. (Applause.) We hope that you will enjoy yourselves and that sometime in the future you will be able to visit us in the summer time.

J. H. Burnham, M.P., West Peterboro: Mr. Burnham pointed out that Canada is now upon the threshold of her opportunity. Canadian farmers are reliant, capable, are descended from worthy stock, and will not only take every advantage of their opportunities, but will, in this trying time of war, show the world that they are worthy descendants of their self-sacrificing forefathers. This war has taught us one thing in particular, and that is that, whatever calling may be doubtful, the farmer's vocation is the only thoroughly safe one. The speaker then reviewed the agricultural conditions of England from the beginning of the thirteenth century, pointing out the status of the farming classes in the old land. He expressed the opinion that Ontario farmers would be greatly benefitted by the

establishment of demonstration farms in every community. Lecturers and instructors had done much for the farmer, but these farms would take object lessons to the people, who would as a result be stimulated to do better work.

In closing, Mr. Burnham said: "I would like to be a farmer, but I am not a farmer, and I suppose I will show my discretion by closing at this time, and therefore, in the words of the Mayor, I wish you all a welcome to Peterboro.

THE CHAIRMAN (Senator Derbyshire): As representative of the Dairymen's Association, I am proud of the flattering reception you have given us here to-night. We are always delighted to come to Peterboro because you have done good work in connection with the dairy business in this district in the past, although you have been falling away a little this last year or two in the matter of making cheese and you are sending your milk to Toronto. Everything is flourishing, because the dairymen have had steadily in their minds the making of cheese, the kind of cheese that has made Canada famous, and they are going to make more cheese and better cheese during 1915.

## PATRIOTISM AND PRODUCTION

DR. C. C. JAMES, COMMISSIONER OF AGRICULTURE FOR THE DOMINION OF CANADA.

We have seen in the last two or three months placards posted up in public places, "Recruits Wanted," and the men of this country, from the Atlantic to the Pacific, have been responding to the call. Within six or seven days from now, you will find all over Canada, from the Atlantic to the Pacific, posters bearing the headline: "Patriotism and Production." This is the second call to the people of Canada. What does it mean?

### PATRIOTISM.

Immediately after the Franco-Prussian war, when Alsace had been torn away from France and made a German province, there were living in that country a young man and his wife of the name of Stallen. It was no longer "home"; they could not stay there; so they crossed the Atlantic and settled down near Digby, in the Province of Nova Scotia. That was forty years ago. When the call of France came across the waters recently the five boys in that family heard it, and to-day they are all on the fighting line along with the British troops. That is Patriotism. (Applause.)

Thirty years ago there was born in Brest, in France, a child who was christened Ferdinand Tromeur. As a lad he joined the navy, served his time in the naval corps, and eight years ago he left France and came to Canada, a member of the Naval Reserve. He crossed Canada and made his way up into our great northern country, and for eight years he has been a trapper in the valley of the Mackenzie River, in the vicinity of the Hudson Bay Post, at Fort Providence, 1,300 miles beyond the railroad train. Up and down that country he travelled, setting his traps, living at times in the little huts he had built; occasionally returning home. The Chief of the local Indian Band, Peter Squirrel, had a daughter, and this young Frenchman fell in love with her, and married her about a year and a half ago. She was a beautiful girl, they say, and a fine housekeeper. The French trapper was away down the river looking after his traps in the month of Septem-

ber, when, in some way or other, word came to him, six weeks after the outbreak of the war, that France was at war. He started for home. He had gone only part of the way when he was taken ill. Not turning up as expected, one of his Indian helpers went out in search of him, and found him laid up with congestion of the lungs in one of his huts, seventy-five miles away. This Indian helper started off for the North West Mounted Police. The nearest post was some 300 miles distant. Back he came with one of the Royal North West Mounted Police. They brought medicines and an interpreter. They found him, cared for him for three or four days, left him supplies, and went off on other business again. Gradually he improved until he was able to drag himself along and ultimately he reached his home. He told his story to his Indian wife, and she said: "Your country calls you; there is only one thing for you to do, and that is to go." And so he started, and after a tramp of 600 miles, reached Fort Chipewyan, and there he was overtaken, as he told in New York the other day, by some messengers from his home, away back in the wilderness, who had been sent to tell him that since he had left home a baby boy had come to his home. He said, "What was I to do: go back or go on?" He went on, and, joined by another Frenchman, pushed forward until finally they reached Edmonton, and there took the train. They now are on the fighting line. That is Patriotism, and it is developing a citizenship and loyalty in this country that we never dreamed we had. This call from across the waters for men to come over and help has touched the people of this country, and, slowly but surely, we are awakening to the realization of the fact for the first time that Canadians are a people. (Applause.)

## Production.

I do not know that one ought to turn the page and say: "We have not yet begun in the faintest degree to realize what this country and Britain and the other colonies are up against." We cannot realize it; that is utterly impossible. Gradually from now on, day after day, there will come home to us the awful responsibility we are assuming. As messages come back from across the water telling us of what our boys are doing, and what is happening to them—when we read the names of those men whom we have known—then we shall begin, perhaps, to realize that, after all, we are doing something worthy not only of our own country but of the Empire to which we belong. (Applause.) Britain has called for our men, and for our best men; that is the patriotic part of it.

Britain has sent across the waters another call, "Send us not only men, but send us food." That is the problem that is confronting us to-day. We have the call to produce here in Canada in the year 1915 as much food as we possibly can with all of our abilities and our facilities. I was told the other day that farmers had no sentiment; that you cannot appeal to them along that line; that you won't be able to stir the farmers of this country to their duty in this matter unless you can prove to them that it will pay. I don't believe that, and you don't believe it. The farming community of Canada will be as loyal and patriotic along the lines of their work as any other class in the community. (Applause.) It is easier to cheer and be patriotic when the band is playing and the troops are marching along the street than it is to be patriotic producers out by yourselves on the 100 acre farms.

What are we up against? We have here in Canada as fine an agricultural country, naturally, as the sun ever shone on. We have been bragging for years what a great agricultural country this is, and occasionally we have been telling

ourselves what fine farmers we are. Now, as never before in the history of this country, the people of Canada are going to be put to the test. Are we going to produce on the farms of this country, according to our opportunities and according to our duty? We cannot do it by hurrahing, shouting or cheering. We must get down to the serious consideration of this question, and we must look into it as carefully and thoroughly as the big questions, now being considered in connection with armaments in London, Paris, Ottawa or elsewhere, are being looked into. It is not for me to say that you should enlist and go to the front. A Briton does not like to be told that he must do a thing. We have the choice, we can go or not go; but if we decide not to go and that our duty lies at home, then let us sit down and fix carefully our minds upon the duty that we stay-at-home people have to solve. We cannot all go to the front, some of us must stay at home, and those of us who stay at home are carrying on this campaign, not in the same way, but with responsibility equal to those who have gone to the front. Is it possible to meet, in this emergency, the responsibility that is placed upon us? It is not a question of whether Manitoba is going to do her share, or whether Nova Scotia or Prince Edward Island or Quebec, will do their share, you have got to bring this question home to yourselves in the Province of Ontario. More than that, you have got to bring it right home to the farmers here in the County of Peterboro and out in the Township of Otonabee. Every man must bring it home to himself on his own farm.

We have been talking about the possibilities of agricultural development in this country for years. For the last twenty-five years the farmers of this country have been told how they could produce more grain and grass upon their fields, and how they could feed these grains more economically, how they could have better herds, and how they could produce more butter and cheese and more beef. Sometimes the advice has been acted upon and sometimes it has not, but never has there been a time in the history of Canada when it was so imperative that the man who sits and listens should decide what he will do. We have got to get the realization of this war, which is our war, right into our very minds and hearts and souls. Let there be no doubt about it. Do not be satisfied simply with picking up the morning paper and reading about the action at the front. That is not taking part in it; that is not doing your duty. Unless the men of this country will take home with them such advice as I understand they got from this platform this afternoon and put it into operation, they will not be doing their duty to this, their country, nor to the Empire. I wish I could burn these things into the minds of the people of this country. Don't let it go in one ear and out of the other. We are facing responsibilities and duties that never presented themselves before to the people of Canada. We are in the fight, and those of us who stay at home and help on this campaign, and help production, are in the fight and contributing to it just as are the men at the front. Think how you would loath the cowardly man who volunteered to go to the front and who, when in the trenches at the last critical moment, dropped his rifle and fled. You would say that man is not a Canadian. If you farmers, the producers of this country, know by what means you can produce more wheat, more oats, more cheese and more beef, and don't do it, you ought to be classed with the man who drops his rifle and runs for shelter. (Applause.)

What are we going to do about it? We have not any new message: we have simply the old message that has been coming to you for ten or fifteen years; but it is coming now with new force, and you must listen to it. You must take it home and put it into practice or you won't be worthy of the name Canadian. What are

we going to do about it? We propose during the month of January and February that the Dominion Department of Agriculture, and the Provincial Department of Agriculture in Ontario co-operate and hold meetings all over this Province. We are calling them "conferences," because the word expresses more clearly than any other the nature and the object of the gathering together of farmers to go over these old things—these old stories, these old teachings—and to try to bring them forcibly home to the farmers, so that with a new spirit, a new energy, and a new viewpoint, they may set themselves to work to help produce the food the nation calls for. The men who are to address these meetings, are just such as those who spoke to you this afternoon and will speak to you to-morrow—men who know what they are talking about, men who can confer with you and who will discuss these simple lines of better farming. We are asking the better farmers in the different communities to take part. In order that fresh stimulus may be given to it, there will be issued within the next two weeks from the Department at Ottawa an agricultural hand-book. We have called it the Agricultural War Book. If you want to take part in this, and want to know a little more about the countries that are in this war, how they are equipped agriculturally, what they are producing, how they have grown agriculturally, what this war means to them, and a thousand and one of the things we have been talking to you about, just drop a line to the Department of Agriculture at Ottawa and they will be very pleased to send you a copy of that book.

This is all talk; it is more talk, and if it stops there, those of us who have been doing the talking will simply have misspent so much time. The final outcome of it all is that it is up to the farmers of this country, for the first time probably in the history of Canada, to do their level best, because upon their work has to be built the foundation of the industrial life of this country, and out of the soil of this country there must be produced the millions upon millions of dollars' worth that will go, not merely to feed the fighters at the front and the starving Belgians, but to help pay that tremendous burden of borrowings that we, the people of Canada, have been placing upon ourselves for the last twenty-five years. We never realized what it amounted to until war was declared and the money chests of Europe were closed to us for all purposes except that of war. The Dominion, the Provinces, the great industrial lines, cities, towns and villages—they are all looking to the farmers of this country to solve this great financial problem. Then it applies to you as to nobody else, because while you are helping to feed the Empire and while you are helping to put Canada upon a sound financial basis, you will at the same time be helping yourselves. Over in Europe to-day there are over 18,000,000 men under arms—18,750,000 taken out of the great producing classes, from the farms, out of the factories, out of the workshops, and put into the consuming classes—worse than that, put into the destroying class. All you farmers, the great agriculture army of this country, are in the producing class, and while you are helping the Empire and helping Canada, you are helping yourselves. Here is your opportunity. What are we going to do about it? Put into practice the teachings that have been coming to us for so many years. We know how to do it. The trouble with us in past years has been that we knew more than we put into practice. Now we have got to do as much as we know: that is our duty; and if the farmers of this country will farm and produce as well as they know, no one will be able to say that they did not do their duty in this critical time not only for the Empire but also for Canada, and for every individual in this audience. (Applause.)

## ADDRESS.

Hon. James S. Duff, Minister of Agriculture for Ontario, Toronto.

It occurred to me when Mr. James was concluding his address that practically the last word had been said. I have had the privilege of hearing Mr. James on many occasions. Associated with him as I was in the work of our Department for some years, I know how earnest and unselfish he always is in his work, and those of you who heard his splendid address will certainly come to the conclusion that we know of no man in Canada to-day who has won a high position more deservedly than Dr. James, and we are proud that he now occupies the position of Commissioner of Agriculture for Canada. (Applause.)

There is a thought that fell from Mr. Burnham that I ought to make reference to, and that is the matter of the demonstration farms. That is something that we have considered very carefully. You will remember that a few years ago, prior to the launching of what is known in this Province as the District Representative System, the cry was, "Get the knowledge of the colleges to the people." I have been around the college at Guelph for some years; I visit it in the summer as well as in the winter. That farm is conducted in a splendid manner. Every precaution is taken to produce the best results, and although it is there, quite close to the city of Guelph, yet you need not go two miles from that farm to find some pretty shiftless farmers, notwithstanding that they are always within gunshot of that great demonstration farm. Therefore, I do not think you can place a demonstration farm in this county, or any other county, that will be of any great advantage to the people. We have taken the other position, and we believe the people all over this Province appreciate very highly the position we took in the appointing of District Representatives, the placing of young men in various counties of the Province to get in touch with the people engaged in agriculture and to bring back to them the teaching of the colleges. We have great colleges of various kinds in Toronto and young men go there and get their training, but they do not stay in Toronto; they take their knowledge back to the districts wherever they may settle, and whether as clergymen or lawyers or dentists or doctors, they bring back with them the teaching of the college. So that I think, after all, we cover very much more ground and get in touch with a great number more people by the system that we have inaugurated and which is being carried on with such success in the Province than if we established demonstration farms in every county. Our people have responded wonderfully well all through Canada, not only by sending our young men to the front, 30,000 of whom are to-night at Salisbury Plains, many of them ready and yearning for the command to go to the trenches, but our people at home are responding nobly to the call for the relief of the Belgians and for the Red Cross work and in many other ways. Whatever we have done has been well done, and I think that will be an incentive for our people to follow the lines indicated by Dr. James to-night, and next season we will see such an effort on the part of the people of this Province for production that has possibly never been witnessed before.

Shortly after the war broke out, it dawned upon many men the situation we would be in. They knew they could not go to the front and that their duty was to stay behind. In order to stimulate the movement for greater production, the Department over which I have the honor to preside, issued a circular and we got in touch with the farmers of the Province, just about the beginning of the fall wheat season. Whether it was the result of that circular or not, I am not prepared

to say, but we do know that there is an increased acreage of fall wheat in this Province of some 25 per cent. beyond what has been the average acreage for some years past. (Applause.) Another pleasing result is that the fall wheat never looked better than it did this season. That work was certainly followed up by the farmers by the great preparations they made for next spring. I travel a great deal through this Province, and I think I am safe in saying that the fields were never plowed so well or presented quite such an appearance as they did this fall, and I am in hopes that the meetings which Mr. James has already given notice of, and which the Dominion Department and our Department are acting conjointly with, will have such a stimulating effect that next spring will see the farmers working with a great deal more determination than ever to do their part to bring about a bountiful harvest during 1915.

I have always had an idea that in this Province of Ontario, with its variety of climate and resources and soil, and with its variety of agricultural possibilities, the men who will be successful are the men who are well developed agriculturists in the line best suited to the locality in which they live. The men who are in what are dairying districts, take it for ten, fifteen or twenty years, will make more money out of dairying in these districts than they could out of anything else. It is the same with regard to fruit, so that in the last analysis, when a young man settles down on a farm, one of the first questions he should ask himself is this: "What is my farm best suited for?" Some men, when beef gets to a very high price, leave off dairying and go into beef cattle, and then, when beef goes down, they try to get back into dairying. The same thing happens with regard to hogs; every farmer in this country should keep a number of hogs, but he ought to move moderately in that line and he should keep hogs no matter whether they are 5½c. or 9c., and that kind of a man in twenty years is sure to make money out of hogs.

I think it must be admitted by every person who looks carefully into it that we are up against a great fight; but we have this advantage, although the British are not a military people, and military operations have never held first place in the minds of the British people, and Germany has been preparing for this war for forty years—from the days of Bismarck when they defeated the French right down to the present time, the German people have been determined that the time must come when Germany should practically rule the world—the fight to-day is for freedom and for liberty, the same freedom and liberty which our fathers fought for and which we are determined to hold. There is one thought that must be pleasing to every person, and that is from the very moment that the bugle sounded, that morning of the 5th of August, and when the newspapers the world over announced that England had declared war against Germany, when England said we will not allow Belgium to be trampled under foot, we will not allow this little nation to be destroyed—from that moment, to the astonishment of the world, Britons in every part of the world responded to the call of the Mother Land. (Applause.) Germany thought that England was tied up with her Home Rule controversy and internal troubles; she thought that Canada would be prepared to lie quietly by, and that India would rebel against British rule, and that South Africa would assert itself and endeavor to form a republic, and that Australia and New Zealand—these far-off nations of the Empire—would be glad to get away from the Mother Land: but the very moment the old Lion growled, the cubs commenced to talk. Canada responded, India responded, South Africa responded, Australia, New Zealand, and the Islands of the Sea all responded; and to the astonishment, not only of those who are our enemies, but to the astonishment of the civilized world,

Britain presented an unbroken front, and that has done more to raise Britain in the estimation of the eyes of the civilized people of the world and to make Britons feel that they are Britons the wide world o'er than anything that has happened since the Napoleonic war. (Applause.) After this war, this country of ours will be more British than ever. We will not hear any criticism about money being honestly administered in order to keep up a militia in this country. I believe there is a spirit engendered in Canada since the war began that will live after the war is over. The nation that intends to be looked upon as a nation prepared to defend itself should always take the necessary measures for that purpose, and I believe some scheme will be inaugurated that will permit of our being prepared to take care of the future, and the future will bring us together as we have never been brought together before. We will be brought together in the lines of agriculture, manufacturing, and other ways. There is no doubt a tremendous sacrifice will have to be made before this war is over, but I feel that when that time comes we will have won a victory worthy of the sacrifices we have made, and the British people will feel in the years to come that those who took part in that great sacrifice did a great service for the Empire of which we form a part. (Applause.)

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## REPORT OF DAIRY INSTRUCTION.

G. G. Publow, Chief Dairy Instructor for Eastern Ontario, Kingston.

I take pleasure in submitting to you my twelfth annual report as Chief Dairy Instructor and Sanitary Inspector for the season of 1914. The nature of this work is of necessity very similar each year, so that consequently the arrangements of these annual reports cannot be varied to a very great extent. Certain changes, however, take place in the personnel of the staff of instructors, new difficulties are constantly arising and changes are produced by the natural conditions of climate and general business, so that the work of Dairy Instruction and Inspection must be in accordance with the changes in other fields more or less closely related to the great industries of agriculture.

The usual staff of instructors was employed this year with the exception of Mr. Elliott, who resigned to accept a position in the Dairy School at Kingston. The vacancy was filled by re-arranging the groups so that the work of looking after the extra factories was divided amongst the other members of the staff.

As in former years the instructors were given a short course of instruction at the Kingston Dairy School, in the month of April, the benefits of this course always being evident in the continuance of greater uniformity in the work of instruction and inspection.

It would be practically impossible to give in detail a report of the work accomplished by each instructor in the twenty-two districts, so I have arranged the usual tabulated form which gives this information in as concise and simple a manner as I have been able to devise. I will not attempt to read these, as although they contain much of interest and represent a great volume of labour, being made up of figures and statistics they are bound to become more or less tiresome. I will, however, with your permission, touch on some of the most important points, which are of more or less interest and importance to the dairymen of Eastern Ontario at the present time.

The total number of cheese factories in operation this season was 846, being 36 less than a year ago. Of these 846 factories, 8 were destroyed by fire during the summer and 5 were closed owing to the shortage of milk supply. The sanitary condition of most of the factories has continued to improve, and it was necessary to close only one, and that for only a few days to enable them to clean up and make the required alterations.

The amount of money spent in repairing or improving individual plants may not seem very large, but 435 factories have expended during the year a total of nearly $70,000 for this purpose, which is quite satisfactory considering the present state of financial institutions.

One of the most prominent facts to which I wish to call your attention, is the great shortage or decrease in the total milk supply. This has been due to one or more of three things: First—a very much lessened number of cows, there being over 33,000 fewer than last year; Secondly—the dry season which in many districts spoiled the supply of grass, green fodder, and water; and thirdly—to the continuance of cheese factory patrons to yield to the inducements offered by creamery-men and ship their cream to the cities. The latter reason may perhaps seem more real if note is made of the fact that there were 2,339 less patrons in 1914 than there were in 1913. The actual number of pounds of milk delivered to the factories between May 1st and Nov. 1st was 843,629,539. From this milk 77,085,587 pounds of cheese were manufactured, and those who follow the figures of cheese production will recognize at once that there has been a big falling off in this respect. The actual shortage is 9,104,796 pounds; or if we allow an average of 85 pounds per box, these figures represent a shortage of over 107,000 boxes.

This is certainly a big shortage, and the only redeeming feature in connection with it, is the fact that the production of milk per cow has continued to increase. This year the increase has been 170 pounds per cow, which in spite of dry weather is certainly encouraging and shows beyond doubt that the work of the Cow-testing Associations and similar organizations is bringing forth good results.

Still another indication that the dairymen are appreciating the need for better business methods is shown by the large number of silos built during the year, there being nearly 900 new ones; and if this form of improvement continues we should, another year, see an even greater increase in the average of milk per cow.

It seems, however, that the question of the percentage of fat in the milk is being neglected too much, as this year again we find that the average test for Eastern Ontario has been lowered by .02 per cent., and it has taken two-tenth of a pound more milk to make a pound of cheese than it did a year ago. Of course the decreased yield of cheese has to a certain extent been due to the general qualities of the milk as affected by the hot weather of which the last season had an unusual share. This question of milk supply as usual has been the greatest factor of our factory work, and probably will continue to be so for some years. Great strides have undoubtedly been made by many patrons in the caring for and cooling of their milk, but their labours have been partially lost by other patrons of the same factories failing to do likewise. The better patrons are therefore asking, "What is the use in our cooling our milk when our neighbours do not and it all goes into the same vat?" This is something which the Dairymen's Association and dairy instructors must endeavor to solve: that is, some workable method by which the milk of all patrons will be cooled and properly cared for before it reaches the factory. This is undoubtedly our greatest dairy problem.

| Instructors and Groups. | No. of factories in group. | No. of full day visits. | No. of call visits. | No. of patrons in group. | No. of patrons visited. | No. of samples tested for adulterations. | No. of samples deteriorated. | No. of samples tested by fermentation test. | No. of factories pasteurizing the whey | No. of factories making whey butter. |
|---|---|---|---|---|---|---|---|---|---|---|
| Almonte— | | | | | | | | | | |
| W. J. Ragsdale | 43 | 57 | 147 | 1,810 | 94 | 1,382 | 0 | 63 | 1 | 3 |
| Alexandria— | | | | | | | | | | |
| C. B. Larry | 37 | 40 | 243 | 1,021 | 62 | 677 | 6 | 200 | 1 | 0 |
| Brockville East— | | | | | | | | | | |
| A. H. Wilson | 46 | 56 | 231 | 1,202 | 38 | 1,231 | 2 | 268 | 18 | 6 |
| Brockville West— | | | | | | | | | | |
| S. S. Cheetham | 42 | 51 | 155 | 1,039 | 53 | 1,102 | 1 | 166 | 14 | 15 |
| Brockville North— | | | | | | | | | | |
| Peter Nolan | 48 | 48 | 216 | 1,166 | 35 | 966 | 0 | 75 | 1 | 21 |
| Belleville— | | | | | | | | | | |
| Hugh Howey | 33 | 27 | 283 | 1,376 | 117 | 2,309 | 0 | 82 | 2 | 0 |
| Cornwall— | | | | | | | | | | |
| J. Buro | 37 | 52 | 240 | 1,243 | 60 | 1,005 | 0 | 600 | 17 | 0 |
| Campbellford— | | | | | | | | | | |
| R. T. Gray | 30 | 41 | 206 | 1,064 | 43 | 2,132 | 3 | 0 | 1 | 0 |
| Finch— | | | | | | | | | | |
| T. J. Ellis | 39 | 38 | 250 | 1,132 | 0 | 785 | 0 | 0 | 0 | 4 |
| Kemptville— | | | | | | | | | | |
| W. H. Gardiner | 39 | 80 | 224 | 1,326 | 40 | 1,370 | 0 | 0 | 2 | 3 |
| Kingston— | | | | | | | | | | |
| H. Brentnell | 39 | 62 | 192 | 1,141 | 56 | 1,117 | 4 | 0 | 1 | 7 |
| Lindsay— | | | | | | | | | | |
| D. J. Cameron | 24 | 38 | 135 | 1,058 | 46 | 1,064 | 2 | 26 | 3 | 4 |
| Madoc— | | | | | | | | | | |
| Chas. Linn | 32 | 98 | 166 | 1,026 | 67 | 1,000 | 3 | 30 | 1 | 0 |
| Morrisburg— | | | | | | | | | | |
| C. W. Norval | 46 | 58 | 218 | 1,376 | 63 | 1,187 | 5 | 190 | 2 | 18 |
| Ottawa— | | | | | | | | | | |
| Jas. Mitchell | 37 | 57 | 233 | 1,003 | 28 | 926 | 5 | 40 | 2 | 5 |
| Ottawa East— | | | | | | | | | | |
| A. McKinley | 40 | 39 | 279 | 1,244 | 88 | 384 | 0 | 91 | 0 | 2 |
| Perth— | | | | | | | | | | |
| J. H. Echlin | 42 | 46 | 173 | 1,400 | 105 | 600 | 0 | 0 | 0 | 6 |
| Peterboro'— | | | | | | | | | | |
| R. W. Ward | 23 | 73 | 206 | 754 | 184 | 184 | 4 | 0 | 0 | 4 |
| Picton— | | | | | | | | | | |
| T. E. Whattam | 35 | 41 | 212 | 2,236 | 142 | 907 | 0 | 73 | 10 | 20 |
| Plantaganet— | | | | | | | | | | |
| Jas. McAllister | 46 | 63 | 224 | 1,203 | 22 | 697 | 5 | 40 | 0 | 0 |
| Napanee— | | | | | | | | | | |
| G. H. Bensley | 46 | 25 | 195 | 2,771 | 40 | 3,049 | 0 | 27 | 3 | 5 |
| Vankleek Hill— | | | | | | | | | | |
| G. H. Barker | 42 | 45 | 293 | 955 | 75 | 1,055 | 0 | 51 | 2 | 0 |
| | 846 | 1,135 | 4,821 | 28,546 | 1,458 | 25,129 | 40 | 2,165 | 81 | 123 |

INSTRUCTORS FOR SEASON OF 1914.

| Average per cent. of fat left in whey. | Average per cent. of fat in milk. | No. of factories paying by test. | Lbs. of milk delivered from May 1st to November 1st. | Lbs. of cheese made from May 1st to November 1st. | Average lbs. of milk to make a pound of cheese. | No. of factories with cool-curing rooms. | No. of factories which made improvements in buildings or plant. | Estimated expenditure, including new buildings. | No. of factories kept in a sanitary condition. | No. of new silos built. |
|---|---|---|---|---|---|---|---|---|---|---|
| .21 | 3.64 | 2 | 42,780,677 | 3,904,590 | 10.95 | 2 | 35 | 4,750 | 42 | 37 |
| .20 | 3.60 | 8 | 29,497,957 | 2,796,729 | 10.54 | 0 | 5 | 3,500 | 33 | 20 |
| .22 | 3.63 | 2 | 48,810,346 | 4,387,299 | 11.12 | 2 | 25 | 3,339 | 41 | 42 |
| .24 | 3.56 | 3 | 49,592,198 | 4,449,198 | 11.10 | 3 | 30 | 5,610 | 31 | 15 |
| .22 | 3.50 | 0 | 50,974,047 | 4,673,606 | 10.90 | 2 | 8 | 1,100 | 40 | 12 |
| .22 | 3.54 | 0 | 39,819,821 | 3,505,100 | 11.30 | 7 | 9 | 3,700 | 33 | 31 |
| .21 | 3.70 | 11 | 40,009,451 | 3,751,092 | 10.66 | 1 | 23 | 2,340 | 30 | 41 |
| .22 | 3.56 | 0 | 27,602,932 | 2,441,197 | 11.30 | 3 | 22 | 1,150 | 30 | 32 |
| .21 | 3.60 | 5 | 36,230,344 | 3,351,548 | 10.81 | 0 | 26 | 4,000 | 39 | 100 |
| .22 | 3.54 | 10 | 38,878,956 | 3,521,810 | 11.03 | 1 | 26 | 2,500 | 38 | 66 |
| .26 | 3.70 | 1 | 37,474,352 | 3,197,414 | 11.09 | 0 | 5 | 5,550 | 36 | 30 |
| .20 | 3.52 | 7 | 19,788,124 | 1,786,827 | 11.07 | 8 | 20 | 1,000 | 24 | 62 |
| .22 | 3.60 | 0 | 35,485,777 | 3,179,535 | 11.15 | 2 | 19 | 2,690 | 32 | 13 |
| .23 | 3.46 | 4 | 50,739,125 | 4,733,060 | 10.72 | 1 | 40 | 2,500 | 33 | 34 |
| .21 | 3.48 | 10 | 846,046 | 3,113,267 | 10.87 | 1 | 19 | 1,450 | 33 | 64 |
| .21 | 3.57 | 5 | 33,828,752 | 3,227,151 | 10.48 | 0 | 10 | 4,344 | 35 | 12 |
| .20 | 3.52 | 0 | 35,784,547 | 3,226,423 | 10.85 | 1 | 16 | 3,350 | 38 | 46 |
| .22 | 3.56 | 3 | 13,945,872 | 1,253,187 | 11.12 | 5 | 18 | 1,020 | 23 | 34 |
| .24 | 3.50 | 0 | 53,235,516 | 4,797,872 | 11.09 | 11 | 25 | 4,300 | 33 | 57 |
| .22 | 3.72 | 0 | 26,871,197 | 2,617,888 | 10.26 | 0 | 27 | 3,073 | 41 | 6 |
| .21 | 3.60 | 0 | 66,698,228 | 6,183,783 | 10.78 | 5 | 18 | 5,275 | 20 | 33 |
| .22 | 3.70 | 5 | 31,735,274 | 2,947,012 | 10.76 | 0 | 9 | 950 | 42 | 25 |
| ..... | 3.58 | 76 | 843 629,539 | 77,085,587 | 10.90 | 55 | 435 | 67.491 | 750 | 812 |

and the one to which we must look as a basis from which to further improve both the quality and quantity of the cheese output.

A certain amount of milk adulteration still continues, but this is limited and becomes less and less each year. During the past season 34 dairymen were prosecuted and fined a total sum of $985.00. This is 13 less than in 1913, and is a smaller number than we have had in any previous season.

From the cheese-makers' point of view the most important point is undoubtedly the quality of the cheese as it reaches market, and I think there is no doubt that the quality this year has been again improved. That is, there have at least been fewer inferior cheese. The finish especially has been bettered and although it is doubtful whether or not the boxes have been any stronger, the manner of boxing has been very appreciably improved.

Improvement that stands out prominently as a result of dairy instruction is the great decrease and almost elimination of acid or sour cheese, and as a result of the intelligent use of commercial cultures, whey pasteurization and cleaner whey tanks, an almost equal elimination of badly flavored cheese.

During the hot dry weather accompanied by the dusty atmosphere, the usual defects accompanying such conditions were met, although perhaps in a lessened degree, and so long as even some of the patrons fail to prepare for such conditions more or less of these defects are bound to exist in spite of all efforts the makers may put forth to remedy them.

The most noticeable defect is that of openness due mostly to the unsound condition of the milk, and this is one fault which the makers experience the greatest difficulty in remedying, frequently the cheese being apparently well made but opening up afterwards from the effects of organisms that had been present in the milk. Such defects as these are of course avoidable if the milk producers will only do their part, and surely the record breaking high prices of the past season (averaging about 13½c.) and which promise to be still higher next year should do much to stimulate both the production of milk and the proper care of it. We all must feel deeply the gravity and importance of the great death struggle for existence through which the Mother Country, our greatest cheese buyer, is passing and every Canadian dairyman should appreciate his individual responsibility in preparing his share of the product which enters so largely into the food supply of every Britisher whether he is fighting in the ranks or performing his duties at home.

## The Creameries.

It seems advisable that the report of the creameries of the district should be kept separate from the cheese report as there are a number of points that concern only butter manufacturers and their patrons, and which are deserving of special attention and discussion at this convention.

For convenience of reference I have prepared a tabulated form similar to that used in the cheese report, but prefer to touch on only the more essential points that may through a discussion by the creamerymen present bring forth suggestions for the betterment of the quality of the butter being manufactured from year to year.

There were 35 regular creameries operated in 1914, and 17 of these were inspected by Mr. L. A. Zufelt, the others being looked after by the several instructors in whose groups they are.

| Creamery Instructors | No. of creameries | No. of visits | No. of patrons | Average per cent. of fat in cream | Lbs. of butter from May 1st to Nov. 1st | No. of tests for moisture | Average per cent. of moisture | No. of samples showing over 16% | No. of creameries using scales for weighing samples | No. of creameries using pasteurizers | No. of creameries having good storage | Average temperature of storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L. A. Zufelt..... | 17 | 42 | 2560 | 27 | 1,325,217 | 46 | 14.4 | 3 | 9 | 2 | 13 | 40 |
| R. W. Ward ..... | 2 | 34 | 108 | 28 | 52,740 | 0 | 0. | 0 | 0 | 0 | 0 | 45 |
| W. G. Gardiner ... | 3 | 12 | 485 | 25 | 584,970 | 0 | 0. | 0 | 0 | 1 | 3 | 37 |
| R. T. Gray..... | 1 | 5 | 110 | 24 | 65,000 | 0 | 0. | 0 | 0 | 0 | 1 | 42 |
| A. H. Wilson..... | 1 | 6 | 25 | 28 | 36,178 | 4 | 12. | 0 | 0 | 1 | 1 | 44 |
| Hugh Howey..... | 1 | 5 | 145 | 30 | 160,420 | 0 | 0. | 0 | 1 | 0 | 1 | 45 |
| D. J. Cameron..... | 5 | 32 | 875 | 28 | 554,106 | 10 | 13.6 | 1 | 2 | 1 | 3 | 42 |
| J. H. Echlin..... | 5 | 10 | 600 | 29 | 313,192 | 4 | 15. | 0 | 2 | 0 | 4 | 50 |
| | 35 | 146 | 4908 | 27 | 3,091,823 | 64 | ..... | 4 | 14 | 5 | 26 | ..... |

Most of the creameries are reported as being in a reasonably sanitary condition, having good drainage and water supply, and satisfactory storage facilities for the limited time during which the butter is kept on hand.

Three new creameries were built since 1913, and in addition to these 33 combination factories made butter during the spring and fall, and 123 cheese factories manufactured butter from the whey.

During the six months (May 1st to Nov. 1st) the 35 regular creameries made a total of 3,091,823 pounds of butter which sold for an average price of 24½c. per pound, this being about one cent per pound less than last year.

Most of the butter is sold very soon after being made, to the scores of the towns and cities and consequently the instructors have very little opportunity of inspecting it. Even although the butter goes into consumption rapidly the quality is not what it should be, and this has been clearly demonstrated when Ontario's butter has gone into competition with butter from Quebec and some of the Western Provinces.

The greatest source of defects lies in the generally poor quality of the cream supply, and so long as the present methods of purchasing cream are continued, very little improvement can be hoped for, even although our butter-makers are as capable as those of the other Provinces.

I am very strongly of the opinion that if we are to make any marked improvement in the quality of our butter it has to come largely through the supplying of a sweeter and better flavoured cream so that full advantage can be taken of the merits of pasteurization, and commercial cultures. And what means would be more effective and fairer than that of paying a premium for the cream that is in a better condition to enable the butter-maker to make better butter than from cream of poorer quality.

If a system of grading cream and butter were adopted it would seem to be the proper method of overcoming the difficulty, and while such a plan may have its difficulties at first, others are already reaping its advantages and what others can do, we also can.

If this convention cannot think of something better, I would suggest that a conference of the creamerymen be held at some early date to consider this method, or any other that may produce the desired results. The fact that the question has been publicly asked through the press, "What is the matter with

Ontario butter?" should cause us to bestir ourselves and look about to see if the methods practised by our competitors are better than ours, and if so adopt them. Let us not be satisfied until we are producing as good as the best.

In closing I wish to again express to the instructors my appreciation of their efforts and hearty co-operation, and in this I must include the cheese merchants of Montreal, from whom we have always had the greatest courtesy and assistance in all matters that seemed to be of benefit to the great industry in which we all form a part.

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## THE MILK SEDIMENT TEST AS A MEANS OF FURTHER IMPROVING THE CHEESE FACTORY MILK SUPPLY.

FRANK HERNS, CHIEF DAIRY INSTRUCTOR FOR WESTERN ONTARIO, LONDON.

Before taking up my paper, I would like to say a word in connection with dairy conditions in Western Ontario. We had an exceptionally good year in 1914—the climatic conditions seemed to favor us in nearly every section; possibly the south-eastern section was a little dry. We made more cheese in 1914 than we did in 1913. In 1913, we made 21,000,000 pounds of cheese and 18,000,000 pounds of butter. Now, if you figure that 18,000,000 pounds of butter into cheese, allowing 2½ pounds of cheese to a pound of butter, you would have considerably over 40,000,000 pounds of cheese. There are over 30,000 patrons supplying cream to the creameries in Western Ontario and you can see what a problem we have in endeavouring to improve the quality of the cream with only three creamery instructors to handle 126 creameries and to try to help 30,000 patrons.

A suggestion has been made in connection with the grading of cream; I was going to offer one other suggestion. I do not know whether it would be successful or whether it is practicable, but it seems to me that for a long time we have been paying an equal price for all qualities of butter. That works out very nicely when you can sell almost any kind of butter at a high price, because when the Western Provinces needed it, the buyers would take it and make very little comment, but conditions have changed within the last two or three years, particularly the last year. Larger quantities of butter are being made in the West and they are improving the quality, and so far as we can see, it is doubtful if we will be able, in the future, to sell very much butter to the West. That being the case, there is no doubt but what we will be up against the question of price, and lower prices will probably mean some system whereby the markets will take care of the question of grading to a certain extent. We have had a large creamery trade which is very difficult to handle in the way of grading, but I cannot see why some plan could not be worked out whereby the boxed butter can be graded. I believe if we did something along that line it would work back to the creamery end, and the owners of the creameries would be in a position where they would have to recognize the grades of cream in order to make the quality of butter that would bring a higher price.

It is just possible that my judgment may be questioned as to the advisability of discussing (the word discuss is used advisedly) this subject of sediment in milk. Practical experience, however, as well as the results of scientific research points out in no uncertain manner that greater attention should be given this very important question, because "clean milk" and "well cooled milk" covers the fundamental principles underlying sanitary production.

Why This Test?—The report of the dairy instructors made on their regular visit to each factory asks the question, "Condition of milk as to sediment." The answer often is, "Considerable," "some," "too much," etc. The appearance of the milk strainers at many of the factories indicates that the instructor's judgment is not overdrawn. Continued and painstaking work on the part of the cheese-makers and the instructors, in bringing to the attention of the patrons this very undesirable condition and the co-operation of the patrons themselves, has resulted in marked improvement from year to year.

To my mind how best to get further improvement on this point is a problem worth looking into.

The writer has no desire to see imposed on milk producers any unnecessary or unreasonable restrictions. There is, however, no reason why the comparatively small percentage of those who deliver over-ripe or tainted milk should not be expected to produce milk equally as fit for cheese making as the majority. In justice to the careful, painstaking patron every effort should be made to have all milk arrive at the factory in equally good condition.

Effect of Sediment in Milk.—Bacteriologists have shown and frequently call attention to the fact, that, large numbers of bacteria may be carried into milk, the organisms clinging to substances such as bits of straws, hay, hairs, road dust, stable dust, fecal material, etc., and that some definite relation exists between the keeping quality of the milk and the amount of sediment it may contain.

Aside from the flavors produced in milk by feeding high flavored foods, those produced through absorption and from contamination by unsterilized utensils (assisted in some cases by returning fermented sour whey in the milk cans) most of the abnormal flavors with which we have to contend are undoubtedly the result of the development of gas producing and putrefactive organisms, a large number of which get into the milk through careless milking.

Cooling Necessary.—Cooling the night's milk to at least 65 degrees is absolutely necessary under any conditions and if greater care can be exercised in the milking, the number of troublesome organisms which have to be controlled should be less.

The Curd Test.—The curd test is a useful factor in determining the special milk that is producing bad flavors in the cheese and its use should be continued.

The weak point in the curd test is that the average patron finds it difficult to recognize abnormal flavors, because he has not been trained to understand the significance of the odor and appearance of curd. The patrons may in many cases detect any peculiar condition of the milk, but chiefly only when the milk is overripe or sour to the taste.

When, therefore, the patron is confronted with the curd test (which to the instructor or cheesemaker quite clearly demonstrates a familiar taint) he frequently is not convinced that anything is particularly wrong with the milk. He is not always sufficiently impressed to induce him to change his methods.

The Use of the Sediment Test.—I was somewhat sceptical as to whether this test would, under factory conditions, be of any real value in assisting the instructors in their work. After considerable discussion, we decided to try out two tests, and after a month's use the results were so favorably reported on, that, with the consent of the Director, we furnished one to each of the cheese instruction staff.

A number of patrons immediately became interested in this test. It is something they can see and understand. At first, interest may be aroused chiefly

in the appearance of the "disk," but in time the patrons are convinced of the effect of this sediment in the milk as well.

Many patrons at the different factories would come in and watch the instructor make the test. When presented with the "disk" on which was shown the quantity of sediment filtered from a pint of the milk delivered by them, they were astonished and could hardly believe that such an amount could possibly be there.

The test appeals to the producer's sense of pride, and in nearly every case they expressed a desire to have their milk arrive at the factory in a cleaner condition. It is possible that careless methods may be practiced and some of the particles strained out, but our experience is that when the milk is comparatively free from sediment, care has been taken in milking, as well as in the straining.

In the light of present day bacteriological knowledge, there is every reason to believe that in the early days, greater stress might have, with advantage, been laid on the problem of keeping the sediment out of the milk so far as possible and probably less upon straining it out after it is allowed to get in.

As evidence that most of the sediment may be kept out of milk by the exercise of reasonable care, we might mention that in some cases the "disks" were quite free of sediment, in others comparatively so, while many "disks" indicated extremely careless methods.

The sample is not taken from the milk in the bottom of the milk can, but from a fair average of the milk, obtained either at the weigh can after the milk is poured in, or at the end of the milk conductor.

A test of the milk may be made and the result shown to the patron at once, or the "disks" may be stuck on pieces of cardboard, numbered and kept for reference or to be shown the patrons later. If the test is to be used by the cheesemaker it may be attached to a movable arm over the weigh can and when not in use it is pushed back out of the way.

Judging from the practical work of one season which included several thousand tests, it looks as though the continued use of the test is bound to give good results. It opens up the way for the cheesemaker or the instructor to discuss with the patrons the various important points in connection with handling and cooling the milk.

*Summary.*

1. The presence of sediment indicates careless methods in milking, and therefore the probability is, that the milk is seeded with a large number of undesirable organisms.

2. The test is a simple method of accumulating in one spot where it may be seen the amount of sediment contained in a pint of milk, and thus enable the operator to judge approximately, from the appearance of the "disk" the total sediment in the can of milk.

3. If the milk is not sufficiently cooled this condition will usually be indicated by the appearance of little clots of dried cream and sometimes casein on the "disk." This means loss of cheese making material.

4. Used in connection with the curd test it makes a combination more effective than the curd test alone.

5. It places the responsibility on the individual patron and leaves little chance for argument on his part.

6. The patrons with few exceptions take a reasonable view of the test as it is something they can see and understand. They look upon it as a test that

indicates not only the better methods of the careful patron but reveals the shortcomings of his careless neighbor. Personal pride in the clean, satisfactory condition of the milk when delivered is awakened.

7. Good judgment must be exercised by the operator in making use of the test, offensive comments withheld, and an effort made to get the patron to understand that, all that is intended, is to point out the facts, with the desire of getting his co-operation. Simply let the appearance of the "disk" do most of the talking at first, as it will eventually appeal to the patron from a logical standpoint.

8. Improvements have been secured through cooling of the milk, the installation of cool curing rooms, the pasteurization of whey, in better methods of manufacture and in more sanitary factories. The milk sediment test I believe to be worth trying out in order to see if it is not possible to promote further and continued progress in sanitary methods of milk production.

Our ideal is "Clean milk," "Well cooled milk" and "Every cheese a fancy cheese."

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## DISCUSSION.

Lead by George H. Barr, Chief of the Dairy Division, Ottawa.

I sometimes think we blame the producers of milk and cream more than we ought to for the inferior quality of our butter and cheese, forgetting the responsibility of the makers and factory owners. Looking over the dairy situation in a general way, do you not think that the patrons of our cheese factories and creameries are about as up-to-date in their methods as are the factory men and makers. As there are not many farmers present to-day, perhaps we had better not say too much about them. I want to ask the makers and managers here if they have the latest equipment in their cheese factories and creameries: are you adopting the most up-to-date methods in the management of your business? I have always felt that the quality of the cheese or butter would not go far wrong if we have the right men in the cheese factories or creameries, because the maker or manager can do more to improve the quality of the milk and cream delivered than an instructor or any other person, and if you are able to secure a maker who has the ability to handle his patrons properly, you have the whole situation in a nut-shell: but if you have to go past the man who is making the cheese or butter to the instructor or some other person to deal with the patrons, the work will never be as effective. There is no man better able to deal with the quality of the milk and cream than the man who receives it at the factory or creamery every day. He is the man we must depend on to keep up the quality of our products.

Then we may go a little further and ask ourselves the question. "What are we doing as managers of creameries and cheese factories to make it worth while for patrons to send better milk and cream?" Are you doing any more to-day than you did ten years ago in the way of paying the patrons according to the quality of the milk and cream they delivered? How many are still receiving milk for cheese-making and paying the patrons the same price per 100 lbs. milk? How many are paying the same price for sour, tainted cream as for clean, sweet cream? You are probably finding a little more fault with the man who sends tainted milk or cream, but he gets the same price just the same. Why should we pay patrons more money if they send rich milk and clean, sweet cream? Because it makes more cheese and

better butter. You may talk about education, but I believe if we would pay patrons well for doing the best work and pay them less for doing poor work, we would accomplish more in one year than we do in ten years by simply talking. It might be a good idea for us to "do more and talk less."

Mr. Herns says there are 30,000 creamery patrons in Western Ontario. How many out of this number are sending tainted and sour cream to the creameries? shall we say half? Is it possible for either the instructors or makers to visit these men? If you were able to visit them, how many would improve their methods because they were asked to; but if the creameries would pay two cents less per pound butter fat to these men, what would happen? Every one of them would come to the creamery to find out how to get the extra two cents. If we would pay our cheese factory patrons according to the cheesemaking value of their milk, we would only be doing what is right. Just as soon as you say to a patron, "We will pay for your milk according to quality," you start that man thinking and the first thing he will ask you is, "How can I take care of my milk in such a way that I will get all that is coming to me?" That leaves an opening for you to put in the right word and you can say to him, "Keep it clean and cool it." He will say, "Why cool it?" and you can tell him why, and so start him on the right road to producing milk that will make the finest quality of cheese.

I am glad that I had to assume the management of the Government Dairy Stations at Finch, Ont., and Brome, Que., as they gave me an opportunity of dealing with the ordinary difficulties of the cheese factory and creamery owners.

TABLE SHOWING DIFFERENT METHODS OF PAYING FOR CHEESE MILK.

CHEESE WITH EQUAL MOISTURE CONTENT (35%) AND VALUED AT 10C. PER POUND.

Value of 100 Pounds of Milk

| % Fat in Milk. | % Casein in Milk. | Actual Cheese made. | Fat and Casein Basis. | Fat calculated Cascin basis. | Fat + 2 Basis. | Straight Fat Basis. | Straight Casein Basis | Pooling Basis. |
|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | % | % |
| 3.10 | 2.10 | 82.9 | 83.6 | 85.6 | 87.9 | 84.0 | 83.1 | 93.5 |
| 3.10 | 2.30 | 85.2 | 86.8 | 85.6 | 87.9 | 84.0 | 90.0 | 93.5 |
| 3.15 | 2.45 | 87.3 | 90.0 | 86.8 | 88.7 | 85.3 | 96.9 | 93.5 |
| 3.20 | 2.30 | 86.3 | 88.4 | 87.9 | 89.6 | 86.7 | 90.0 | 93.5 |
| 3.25 | 2.00 | 91.0 | 84.4 | 89.1 | 90.4 | 88.1 | 79.1 | 93.5 |
| 3.30 | 2.40 | 92.7 | 91.7 | 90.2 | 91.3 | 89.4 | 95.0 | 93.5 |
| 3.30 | 2.40 | 90.6 | 91.7 | 90.2 | 91.3 | 89.4 | 95.0 | 93.5 |
| 3.40 | 2.60 | 95.6 | 96.5 | 92.5 | 93.0 | 92.1 | 102.9 | 93.5 |
| 3.40 | 2.30 | 91.5 | 91.7 | 92.5 | 93.0 | 92.1 | 90.0 | 93.5 |
| 3.40 | 2.00 | 93.6 | 86.8 | 92.5 | 93.0 | 92.1 | 79.1 | 93.5 |
| 3.40 | 2.50 | 86.8 | 94.9 | 92.5 | 93.0 | 92.1 | 90.9 | 93.5 |
| 3.50 | 2.45 | 95.4 | 95.7 | 94.8 | 94.8 | 94.8 | 96.9 | 93.5 |
| 3.55 | 2.45 | 95.9 | 96.5 | 95.9 | 95.6 | 96.2 | 96.9 | 93.5 |
| 3.65 | 2.40 | 93.2 | 97.3 | 98.2 | 97.3 | 99.0 | 95.0 | 93.5 |
| 3.70 | 2.40 | 99.2 | 98.7 | 99.4 | 98.2 | 100.2 | 95.0 | 93.5 |
| 3.80 | 2.50 | 102.1 | 101.1 | 101.7 | 99.9 | 102.9 | 98.9 | 93.5 |
| 4.00 | 2.60 | 107.5 | 106.1 | 106.2 | 103.4 | 108.4 | 102.9 | 93.5 |
| 4.00 | 2.35 | 104.9 | 102.1 | 106.2 | 103.4 | 108.4 | 93.0 | 93.5 |
| Differences over and under actual cheese made. | | (Over) | 22.4 | 17.9 | 24.9 | 18.1 | 48.4 | 47.1 |
| | | (Under) | 20.1 | 11.8 | 14.9 | 16.1 | 51.8 | 46.1 |
| | | | 42.5 | 29.7 | 39.8 | 34.2 | 100.2 | 93.2 |

At the Finch Dairy Station in 1913 we asked the patrons to allow us to pay them for cheese milk according to quality. The majority agreed to the change. Some of the patrons, however, were not satisfied, and for their information we made up a small batch of cheese from four per cent. milk and another from three per cent. milk. The difference in the quality of cheese made from the two lots was so plain that no one could dispute the fact that paying the same price per hundred pounds of milk for all milk delivered was to say the least unfair. We felt that more work should be done along this line for the benefit of our own patrons as well as for patrons of other cheese factories and the chart before you shows the results of our work in 1914.

A careful study of these figures will, I am sure, convince any one that paying all the patrons the same price per 100 lbs. of milk is decidedly unfair and also that paying on the basis of straight fat, fat + 2 or fat + calculated casein is very close to the actual cheesemaking value of milks containing different percentages of fat and casein and, as far as I am concerned, I am willing to adopt any one of these methods as a standard for paying for milk at Canadian cheese factories. I sincerely wish we could get all the recognized authorities on dairying in Canada to agree on one method of paying for cheese milk. If this were done, the patrons would very soon fall into line.

Quebec creamery butter took the best prizes at Toronto and Ottawa fairs last year. Very little, if any, of this butter was made from gathered cream. It was made from cream separated at the creameries and the cream pasteurized; ideal conditions. Can such butter be made in Ontario from gathered cream? I believe it is possible if the system of grading the cream is adopted. Pasteurizing the cream will still further improve the flavor and keeping quality of the butter. All the Western Provinces are grading cream with the very best results and Ontario must follow if the best prices are to be received for the butter.

We have used the Sediment Test at the Finch Dairy Station and find it a splendid indicator in regard to securing clean milk.

I am very glad that Mr. Herns has been able to prove that when milk shows a lot of dirt by the sediment test, it also makes a bad curd. Patrons can see and understand the Sediment Test much more readily than the Curd Test and its use should help very materially in securing cleaner milk at our cheese factories.

Mr. Lane: Mr. Barr is a man for whom I have always had a great deal of regard, but he made some statements this morning in connection with cheese making that I would like to say something about. Sometimes we as cheesemakers in co-operative factories are not allowed to send home the milk. What are we to do in a case of that kind? Sometimes we are up against it because we either have to return that milk or make an inferior cheese. I have been in factories where the directors have told me, "Don't be too afraid about taking any milk as long as you can make passable stuff at all." They did not want us to send back the milk, and have the news get about to the other patrons that some of the milk was wrong. Sometimes I think it is more the duty of the patrons than it is of the maker. However, I do feel that the maker should have backbone enough to refuse to take in poor milk, even if he had to get out of the factory, but I believe that is the position many makers are placed in and they frequently take in poor milk rather than have any trouble.

Mr. L. A. Zufelt, Superintendent of Dairy School, Kingston: There is not very much that I can add to the discussion on the excellent report by Mr. Publow and the statement on the sediment test by Mr. Herns, to which you have already listened so attentively. I can only, perhaps, emphasize what has already been said.

I have been following this question closely for a number of years, especially since I have been appointed Superintendent of the Eastern Dairy School. I felt that I was filling a very responsible position there, and that I should be in a position to find out the weak spots in the dairy industry, so that we would be in a better position to remedy the difficulties and thus improve the general average quality of our butter and cheese. In sifting the whole matter down it strikes me that we have not been carrying this work to the individual in the way that we should. We have been leaning up against the other fellow for support and we have not been standing on our own hind legs. We started this business under the co-operative system and we have been carrying co-operation a little too far, so much so that it is verging really on socialism rather than on co-operation, because the patrons all want to get the same price per 100 pounds of milk, and our factories are all endeavouring to get the same price per pound of cheese, and the defects are being covered up in general averages. The big trouble in the business to-day, especially from the farmer's standpoint, is that the farmers do not want to stand alone; they want to get the same price per 100 pounds as their neighbor, and that is one of the biggest difficulties that the manufacturers have to contend with, and the same thing is carried out when the cheese are sold. In this eastern section, a large percentage of our cheese are sold by salesmen and these salesmen control the cheese in from five to ten or fifteen and twenty factories, and they endeavour to sell the cheese with the least possible criticism against each individual factory. The salesmen want to sell the cheese so that there will be the smallest possible percentage of cut. The result is that I can give you a list of factories where cheese are sold all at the same price, and yet there is a certain percentage of inferior cheese that ought to be sold at a less price. We must get away from this if we wish to make any permanent and lasting improvement in the quality of our cheese. It looks to me as if we have just about reached a stone wall and further improvement is going to be very very slow unless we change our methods. I cannot say what change should take place, but I think we should make an effort to fix the responsibility more on the individual and allow him to profit by his own individual labors as well as to suffer for his carelessness, not only the individual dairymen but the individual factory, and when we do that we will make permanent advancement and we will soon weed out the inferior butter and cheese. To a certain extent our cheese is graded, because it is graded before it reaches the final market. The dealers in Montreal grade these cheese when they are sold to the consumer, but the factories that produce these cheese are not graded as closely as we would like to see them.

It is not my intention to deal particularly with the cheese end of the discussion this morning, but I am simply making these remarks to emphasize what has already been said. I am going to speak more particularly as to the butter situation. You all know that two years ago there was a great boom inaugurated in the manufacturing of butter and large quantities of butter were made. It was said that the cheese industry had seen its best days. We were getting high prices for butter and everybody was encouraged to quit the cheese factory and start manufacturing butter. The result is that to-day the butter industry is in a very critical condition. We have got to that point where our butter must be consumed almost entirely locally. Our foreign market for butter is *nil*. We depended on British Columbia and the North West as purchasers of our butter, but because we were not able to supply enough butter, foreign butter had to be brought in, and when our butter came in competition with this foreign butter, the quality of Ontario butter was such that it suffered in comparison, and the result to-day is

that if we sell butter on the British Columbia market, we must sell it at a discount.

We have pointed to what they have been doing in Quebec and Alberta. Mr. Barr touched on the method of grading cream introduced in Alberta, and we cannot do better than copy their example. We should not be following other people in these matters, but we should be leaders in dairy education. Our men have the qualifications that will place them at the top of the ladder, and instead of following what other people are doing, we are capable of leading in these matters and we should be doing so.

The grading of cream brings home to the individual the fact that he is getting paid for what he is producing. If you have a horse or buggy to sell you sell it on its merits, and butter should be sold in the same way, and cream should be sold in the same way. As soon as we inaugurate some system whereby the individual will profit by his work, we will make advancement. It is not a question of not having the necessary education, because I believe our dairy farmers know how to do these things. We have been preaching for the last thirty years, but that has failed, and we must make it possible for the individual to get more money for the extra work and time he puts on the production of these articles.

I got a report from Mr. Marker, of Alberta, and I think it would be well for me to read a few extracts. It gives his experience in introducing the grading system in Alberta. They have four grades of butter; the special grade is the highest quality, and of special grades they produced this past season over 71 per cent. of the total make; of the first grade, 19 per cent.; second grade, 8 per cent.; and off grades—that is very inferior butter—less than half of one per cent. That is the result of two or three years work. Less than five years ago, Alberta butter stood second to Ontario butter and to-day they take a place in advance of us. The owner of a certain creamery entered into a market agreement with the Alberta Department in the latter part of July and his initial shipment of butter graded slightly over 7 per cent. special, a little over 25 per cent. first and over 45 per cent. second and 20 per cent. off grades. That was the initial shipment of butter. The average price realized for this shipment was twenty-one cents a pound. He says: "Clearly there was something wrong," and one of the Provincial dairy instructors went to the creamery and advised the owner to grade the cream, and after an interval of two weeks another shipment of butter was sent to the Department, and it graded as follows: over 60 per cent. special, 39 per cent. first, and the average price was 25.21c. per pound, showing an advance of over 4c. a pound over the previous shipment. Now what happened? Simply this: The cream received from each patron of this creamery was graded by the butter maker, and the price paid for it was based, not only on the pounds of butter fat which it contained, but also on the grade of butter which could be made from it, and this is where the ultimate market was brought home to the initial producer in the form of dollars and cents and he responded. This owner was afraid to introduce grading because he thought he would lose a large number of patrons, and he wrote later on in the season: "We have only lost four patrons this season, but that has been more than counterbalanced many times by the new ones that we got as they found out the true facts from their neighbors." We are sometimes inclined to hesitate about launching out into new methods because we magnify the difficulties we are apt to meet with, but unless we try we will never accomplish anything. I think the time has come when we should perhaps not talk so much but endeavour to do more, and I believe we should make an honest effort to introduce new methods and perhaps the difficulties will not be as great as we anticipated.

I would second the suggestion made by Mr. Publow in his report that a conference of our creamery men in Eastern Ontario be called, and that this question of grading the cream and butter be discussed, and see if we cannot make some united effort to bring it about.

MR. G. H. BARR: There is a very good precedent in Montreal in regard to that particular question. I feel pretty certain that the Quebec butter exhibited at Toronto and Ottawa fairs last year was from creameries selling their butter on the co-operative system supervised by the Quebec Government. I honestly believe that this co-operative system of selling cheese and butter in Montreal is doing more to improve the quality of the cheese and butter in the Province of Quebec than anything else at the present time. Every creamery that sells butter through the co-operative company must agree to certain regulations, and the prices received are usually the highest paid in Montreal, because the butter is sold according to grade. I think the same method could be adopted in Ontario with Toronto as the headquarters. The Manitoba Government during the past season graded all the creamery butter that was shipped into Winnipeg. Although the returns to the patrons were not made on this grading, each creamery received a report on the quality of every shipment.

I had the pleasure of judging the butter at the Winnipeg Fair last July, and I was very much pleased with the fine quality of the Manitoba butter, and the Government officials attributed the marked improvement in the quality almost entirely to the information that the buttermakers were getting from the grading of butter in Winnipeg.

MR. SINGLETON: Can you outline the method that has been adopted by Mr. Marker in Alberta?

MR. HERNS: I would not undertake to go into that. As I understood it, Mr. Marker has a man who does the grading and he also sells the butter. That puts the whole matter in the hands of one man. Last year they made about 4,000,000 pounds of creamery butter in Alberta, and a big percentage of the cream was graded. I cannot see how we can expect our creamery men in Ontario to adopt a plan unless we offer to handle the butter after it leaves them. I have talked it over with many of the prominent men in Western Ontario who are handling hundreds of tons of butter, and that is a point that we have got to look into in a thorough way.

MR. SINGLETON: I do not see why we could not do it without changing our channels of trade. In Alberta each creamery starts off with churning No. 1 in the spring, and supposing he has ten boxes of butter, he takes one box out of that churning, it is shipped to Calgary and scored there, and he gets back the grader's certificate of churning No. 1, and so on. The Government takes this package of butter and pays the creamery man for it at market prices. Then they put the butter in storage, and it is held for a reasonable length of time, and then the butter is sold. If there is a loss on it, the Government stands for it, but if there is a gain, it is remitted to the creamery.

MR. WILLIAM NEWMAN: I have listened with a great deal of interest this morning to the discussion on the grading of cream. When I returned from my trip to the West a year ago, I came home with the idea that I would grade cream, and I called a meeting of my patrons at each one of my creameries and laid the matter before them, giving them an outline of what I was going to do. I was going to adopt the Saskatchewan system. Mr. Barr very kindly came to one of my meetings, and we had to have an adjourned meeting before the thing was properly brought out. At the adjourned meeting, the people were unanimous in

favor of grading cream. I have to make money out of the business, and I started on this new scheme. Some of the patrons did not intend to do things right, and one of them said I was going too fast, and that I did not give them a chance to cool their cream, that I never told them I was going to do this, and they did not have a chance to put in ice. However, I went ahead, but I did not grade the cream: I got afraid and backed down. But notwithstanding that, in the months of June and July and the first part of August, I never received cream nearly as good as I received during that time, simply because the farmers expected I was going to grade the cream, and I was asked for more suggestions as to how to take care of the cream than at any other time. I was asked as to how to make a box for ice to keep the cream cool. The latter end of August, they knew I was not going to grade and they went back to the same old ways, and the cream came in as bad as ever. I am asking them to prepare to grade the cream next summer and I am asking the patrons to prepare to cool the cream down to 55 degrees. I do not want to do this alone: I would like all the rest of the creameries to go in.

Mr. Marker asked me to send some butter to Calgary Fair. I received his request only a few days before it was necessary to send it, and I sent to the butter-maker and asked him to put up a box of butter and send it to Calgary. This was in the latter part of June, and we just put it into a box and sent it out. I am pleased to say it took tenth place. It was only a few points behind. After the patrons knew we were not going to grade the cream, the scoring of the Toronto butter fell away down. If we were paid for our butter according to grade, it would have more effect on improving it than anything else. Some poor butter was sent to British Columbia with the result that they do not want our butter to-day at all, and unless we make improvement, we are going to lose that market.

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## SUMMARY OF CHEESE EXPERIMENTS, O. A. C., 1914.

Prof. H. H. Dean, O. A. C., Guelph.

### Cheddar Cheese.

Loss Using Overripe Milk.—The average loss per 1,000 lbs. milk in twenty experiments was 6.24 lbs. cheese, where the average acidity at the time of renneting was .205 as compared with milks of similar composition delivered sweet and set at .17 per cent. acidity. There was also greater loss of fat in the whey from the overripe milk lots, the average shrinkage was over one-half per cent. greater, but there was not much difference in the average quality of the cheese, due to the fact that one or two normal acidity lots of milk, were off in flavor, which showed in the cheese, hence the need for not only sweet milk, but clean-flavored milk for cheesemaking.

Results of Stirring and not Stirring During the Cooling of Milk.

| — | Stirred can Temperature. | Unstirred Temperature. | Time. |
|---|---|---|---|
| Date June 1, 1914 | 94° F | 94° F | 5.05 p.m. |
| | 82° F | 90° F | 5.15 p.m. |
| | 72° F | 84° F | 5.25 p.m. |
| | 66° F | 80° F | 5.35 p.m. |
| | 62° F | 76° F | 5.45 p.m. |
| | 60° F | 70° F | 5.55 p.m. |
| | 58° F | 66° F | 6.05 p.m. |

At 7.30 a.m. on June 2nd the temperature of the milk in both cans was the same as that of the water, 54 degrees F. The acidity of the milk in each can was .14 per cent.

| —— | Temperature. | Temperature. | Time. |
|---|---|---|---|
| Date, June 2, 1914 | 94° F | 94° F | 4.50 p.m. |
| | 78° F | 90° F | 5.00 p.m. |
| | 68° F | 82° F | 5.10 p.m. |
| | 64° F | 76° F | 5.20 p.m. |
| | 60° F | 72° F | 5.30 p.m. |
| | 58° F | 68° F | 5.40 p.m. |
| | 56° O | 66° F | 5.50 p.m. |

The acidity of each lot was .135 per cent. at 7.30 a,m. on June 3rd. The milk in the can stirred, cooled more rapidly than did the milk unstirred but the effect on acidity or ripeness of the milk, when tested next morning was the same in both lots on both days of the tests. Similar results were got in 1913.

Mr. T. H. Lund of the Bacteriological Department, conducted Bacterial count tests on May 6th and June 9th, 1913, and on June 1st and 2nd, 1914, with the following results:

Bacterial Count per c.c. of Milk in Cooling Experiment.

"Stirred vs. Nonstirred."

| Late | Time | Mixed Milk | Date | Time | Stirred Milk | Unstirred Milk |
|---|---|---|---|---|---|---|
| May 6, 1913 ..... | 7 a.m. | 65,000 | May 6 | 6,00 p.m. | 480,000 | 340,000 |
| June 9, 1913 ..... | 5 p.m. | 10,400 | June 10 | 7.00 a.m. | 15,000 | 16,000 |
| June 1, 1914 ..... | 5 p.m. | 18,300 | June 2 | 7.30 a.m. | 18,600 | 24,300 |
| June 2, 1914 ..... | 5 p.m. | 12,200 | June 3 | 7.30 a.m. | 19,000 | 20 500 |

In the four tests the bacterial count was higher in the cans of unstirred milk, but Mr. Lund says: "from the data we have secured, I would say that there is very little in it one way or the other."

Relation Fat and Casein in Milk to Yield and Quality of Cheese.—The average of twelve experiments in which the milk tested 3.28 per cent. fat and 1.94 per cent. casein produced 83.63 lbs. cheese per 1,000 lbs. milk; milks averaging 3.58 per cent. fat and 2.04 per cent. casein produced 91.41 lbs. cheese per 1,000 lbs. milk, an increase of 2.78 lbs. cheese. The poorer milks gave a greater yield per pound of fat and also per pound of casein than did the richer milks. The cheese made from the richer milks contained nearly one-half of one per cent. more fat, a little less moisture and scored half a point higher than did the cheese made from the poorer milks.

Pasteurized Milk for Cheddar Cheese.—The pasteurized milk was treated with Hydrochloric acid. The yield of cheese was 94.03 lbs. per 1,000 lbs. milk from the pasteurized lots as compared with 89.37 from the normal milks, a gain of 4.66 lbs. The cheese made from pasteurized milk contained 1.7 per cent. more moisture, and were poor in quality—wholly unsuited for the export trade.

High Moisture Cheese.—High moisture in cheese for local trade increased the yield very considerably and the cheese were fairly good when new, but soon became acidy and were not liked by the consumer.

Acidity of Whey at Dipping.—Curds dipped with an average acidity of .149, produced 88.03 lbs. cheese per 1,000 lbs milk, while curds from similar milks dipped with an average acidity of .175 per cent., produced 86.95 lbs. per 1,000—a loss of 1.18 lbs. The moisture was greater in the cheese from the sweeter dipped lots by about one-half per cent. and the cheese scored about half a point higher. These tests favor sweet dipping of curds on the whole, but there were cases when the cheese from the other lots scored higher indicating that the cheesemaker needs to use good judgment on this point.

Salting Experiments.—Curds were divided into three equal parts and salted at the rate of 2, 2¼ and 2½ lbs. salt per 1,000 lbs milk. The low salting caused a greater percentage of moisture to be retained in the cheese and the shrinkage during one month was less. There was not much difference in the average score of the cheese.

Ripening Cheese at 40 Degrees to 45 Degrees F. vs. Ripening at 60 Degrees to 84 Degrees F.—The cheese ripened at the lower temperature during the whole period, lost in weight during one month 2.15 per cent.; those kept one week in an ordinary room (60 degrees-84 degrees F.) then moved to an ice cold-storage (40 degrees-45 degrees F.) lost 3.36 per cent.; while those left one month in the ordinary curing-room lost 3.99 per cent. in one month. The average moisture content of the three lots of cheese was 35.29 when green, and 35.05, 34.62, and 34.46 respectively at the end of one month. The average scores of the cheese were 93.45 for lots ripened at low temperature, 91.85 and 89.94 respectively for cheese ripened one week in ordinary room then moved to cold-storage, and lots ripened for whole period in ordinary room. These results are similar to those got in previous years and point to the need of ripening cheese at comparatively low temperatures, which reduces shrinkage and improves the quality of the ripe cheese, as compared with ripening at higher temperatures.

## Soft Cheese.

Conditions Affecting Loss of Fat in Whey from Cream Cheese.—The experiments showed slightly greater loss of fat in the whey under the following conditions: using pasteurized cream as compared with raw cream; rich cream as compared with thin cream; low acidity at setting (.15 per cent. acid) as compared with high acidity (.38 per cent.) and setting at 78 degrees as compared with renneting at 65 degrees F.

Temperature and Packages for Cream Cheese.—Temperatures at which cream cheese were held averaging 43.1 degrees F., 48.6 degrees F., 63.5 degrees F., and 68.4 degrees F. were compared, using packages made of glass, card-board box, and wrapping in tin-foil. The results were better when keeping the cheese at the lower temperatures and the cheese kept best in the glass packages, but as these are more expensive and cost more to ship, the card-board box proved most satisfactory, all things considered.

Neufchatel Cheese.—Best results were got by pasteurizing the milk which should contain about 4½ per cent. fat. Seventy lbs. of such milk will make about 44 cheese which retail at 10 cents each, giving a return of $1.40 for about seven gallons of milk. These cheese should be kept in a cool place and be consumed in about 10 days or not more than two weeks.

Buttermilk Cheese.—Raw buttermilk, or buttermilk from cream pasteurized sweet, gave good results. Sour cream pasteurized produces cheese of poor quality and low yield—in some cases none at all, as the curd particles are so fine they pass through the cloth. An average yield would be from 12 to 15 lbs. cheese per 100 lbs. buttermilk, which can be sold at about 5 or 6c. per pound wholesale, where there is a suitable market. It is claimed that methods of making buttermilk cheese from pasteurized sour cream buttermilk have recently been discovered, but up to the present we have not had an opportunity to try these methods.

Cottage Cheese.—This cheese can be made from skimmilk by the use of rennet, or by heating from 80 to 100 degrees F., and allowing the milk to coagulate after pasteurization and having a culture added. The rennet method gives a smoother cheese but the yield was not quite so great as from the heating method without rennet. The average yield from 10 lbs. skimmilk by the heating method was 1 lb. 7.3 oz.—the rennet method, 1 lb. 7.8 oz. Cream at the rate of 1 oz. per pound of curd improves the flavor and consistency of the Cottage Cheese.

As human foods become scarcer and more expensive we shall need to utilize these dairy by-products to greater advantage than is done at present, thus preventing waste, and increasing the supply of cheap, nourishing food for the human race.

Mr. Samuel Armstrong: Was this all the same quality of milk and was it tested?

Prof. Dean: Yes, the average percentage was 3.32.

Q.—What do you determine over-ripe milk?

A.—Over-ripe milk averaged .205 per cent. of acid, normal .17.

Q.—Were both cans of milk set in ice-cold water?

A.—The temperature of the water was 54 degrees; all conditions as nearly alike as possible, except one was stirred and the other was not.

Q.—Was the can that was left standing unstirred covered?

A.—No, not covered, all other conditions were alike except that one was stirred and the other not.

## FACTORY AND FARM WELL WATERS.

Dr. W. T. Connell, Bacteriologist, Queen's University, Kingston.

Factory and Farm Well Waters.—The subject of my remarks is that of factory and farm well waters, and is one upon which I have spoken at a previous meeting of this Association. That good, safe water is essential for drinking, household and dairy use will, I think, be admitted by all. That we are getting such water at our farms and factories is open to serious question. What steps are necessary to improve the character of such waters? Before answering these questions, let us look at sources of farm and factory waters, consider the character of water and the source of pollution to which they are subject.

The majority of our farm and factories depend upon wells, either surface or deep, or upon springs. Most wells are surface or shallow ones dependent for their supply upon the "ground water." This is the water which seeps down through the surface soil into the subsoil until it reaches a layer of rock or hard pan which is impermeable and thus prevents its passage deeper. Along this layer or stratum it flows in the general direction of the dip of this layer which may or may not follow

the rise and fall of the surface soil. In periods of wet weather the level of the ground water rises as all the subsoil right up to surface may be saturated, its pores completely filled. In such cases the level of the water in the well rises very high. After a period of dry weather or drought, and consequent cessation of water seepage from above, the ground water level falls, in fact may almost disappear so that well levels are low or the well goes dry. When in digging a well a man is said to tap a spring he has simply struck a good flow of the ground water through the subsoil, a natural channel which the subsoil water has tunnelled out for itself. If a surface well is favorably placed it may gather ground water even in dry season but as we all know very dry seasons mean many dry wells. Surface springs are but the outcroppings on surface of the ground water and are due to falling away of the surface soil so that underlying impervious strata reach the surface level.

When this country was first settled the water from such wells and springs was almost invariably good. This can still be said for a number of them, but not for the majority, for with settlement and the careless scattering of human and animal wastes too often the well has received drainage from such and can no longer be considered to provide good water. Whether the water is a good safe one will depend on such factors as the character of the soil itself in which the well is dug; the situation of the well in relationship to houses, stables and drains; the cleanliness of soil immediately about well and the protection of well itself so far as regards curbing, covering, etc. To these conditions as factors I will return later after directing attention to the character of water from deep wells.

A deep well is one where water is derived from a second, third or lower water bearing stratum. This means that the water is imprisoned beneath one or more fairly impervious layers of hard pan or rock. Drilled wells in rock may or may not be deep wells, e.g., in a well in fissured limestone such wells are surface wells, but if this or other pervious rock formations are separated from deeper water bearing rocks by an impermeable stratum through which the drill passes then the well is a deep one. Most wells drilled in rock formations lying some distance beneath surface soil are deep wells. The water in these wells is not derived from rain or melted snow seeping down from soil of immediate locality, but is such water derived from higher ground it may be within a few hundred yards or it may be miles away, and which owing to geological formation gets imprisoned beneath strata and flows beneath such in direction of their general dip. Owing to origin of such water on higher ground the water may be under considerable pressure, and when the water bearing area is tapped the water may thus rise in the well pit or drill hole and may even overflow. Deep springs are but the outcroppings of such imprisoned waters and usually are permanent. The water from deep wells and springs is usually fairly pure water, bright, clear and sparkling. In most portions of Eastern Ontario such waters are fairly hard, and in some localities may carry salt, or traces of iron and sulphur. Unless the hardness is too great (when the formation of boiler scale makes its use objectionable for boilers), or such water contains too much dissolved mineral constituents, deep well or spring waters are reasonably safe waters. But there is one source of trouble with such waters, due to lack of protection of well tube or of covering. It must never be lost sight of that a deep well is in most instances, in the first part of its course a surface well so that if care is not taken to keep out the ground water by water tight curbing down to first impermeable stratum then it has the defects of the surface well. Indeed its waters are in reality a mixture of deep and surface waters.

Water Troubles Dependent on Character of Soil.—Most soils act as excellent filters, tending to purify the water which seeps through th[illegible], by its

oxidizing and nitrifying action and by its removal of all suspended particles. The result is that after passing through soil slowly water is cleared and made presentable even though previously murky. In the case, however, of certain clay soils, the clay pulverizes into a very fine sediment and riles or muddies the water and this sediment settles very slowly. The appearance of the water and its contained "mud" render such water unsuitable for household or factory use. I cannot say positively that there is danger from use of same for drinking purposes though if so, one would have to raise the figures of the proverbial peck of dirt allowed each of us. One would scarcely desire to see such water used for washing dairy utensils or for creamery use. Such water too is difficult to treat satisfactorily at farm or factory so as to clear and thus the only recourse is a new source of water supply.

Again wells dug in swampy or mucky soil frequently contain waters rich in dissolved vegetable matter, so much so at times as to color the water. Such water affords an abundant food supply for the support of water bacteria, minute water plants and animals. Especially is this the case during the warmer months of the year when the temperature of the water is high enough to encourage this growth. Such water as a rule is not at all dangerous to health, though it frequently induces a diarrhoeal attack in those not accustomed to its use. It does prove a poor water for dairy and factory use owing to its high bacterial content, and through certain of its bacteria being readily capable of growth in milk and thus bringing about taints in milk, butter or cheese. Such water should be avoided and to do this a better locality should be chosen for location of house, factory or creamery than low lying land.

Water troubles from drainage reaching wells from house wastes, manure, factory wastes, etc. The soil, as I have already indicated, is an excellent filtering and purifying agent, but its capacity for purification is not unlimited. Almost all the purification goes on in the first six or ten inches of soil so that if drainage matter is carried below this it remains largely unaltered to seep down into subsoil and enter any neighboring well. A soil which may be efficiently caring for any wastes thrown upon it may have drainage from the same too rapidly carried through the surface soil for purification to occur, by means of a heavy rain. Too much refuse "sours" or clogs the soil and then the seepage water is sure to carry down the waste into the ground waters. Thus in course of time the ground near poorly kept privies, or in neighborhood of pools of house slop waters or factory drainage, or near manure piles, becomes polluted and such pollution is carried down and into neighboring wells. At times such pollution may travel considerable distances especially through gravelly subsoils. If pollution is traceable to human excreta or wastes then the water becomes potentially dangerous as such may carry certain disease producing bacteria, more especially in this country the typhoid bacillus. Further, whatever the source of pollution such waters always carry bacteria which readily thrive on milk and which are indeed accountable for some of the more serious defects or taints of butter and cheese.

Water Troubles Due to Improper Protection of Well Mouth.—Without doubt improper protection of the immediate surroundings of well and well mouth itself, is accountable for the majority of polluted wells. The defects found are lack of cleanliness about well, lack of elevation of well mouth, defective curbing and poor covering. Where the well mouth is on a level with surrounding soil or lies at a lower level, the well is often but a drainage pit for the surface run off water. Even if well mouth is slightly elevated and curbing is defective seepage quickly makes its way through a few feet of earth and drains into the well. Now if there is a lack of cleanliness about the well, *e.g.*, animals watered near well

mouth and their droppings permitted to be about; or if cans or pails, etc., are washed and water thrown out on ground then the rains would quickly wash such materials into the well. Further, where there is a poor covering surface dirt and dust readily fall into well, or pump drippings carry down a load of dust and dirt from feet of those using pump. Such a means of pollution is exceedingly common and is usually never considered. Poor covering of wells accounts for such findings as frogs and tadpoles, mosquito larvæ (wrigglers), etc. Poor covering or defective curbing will account for the finding at times of mice, rats or even larger animals. One may be sure that where conditions are such as to permit the entrance of these relatively large animals that the opportunities for entrance of the microscopic plants and animals, are enormous.

What do we find when we investigate farm and factory wells? For some years now we have in our laboratory been examining such waters, the data regarding same being supplied by the Dairy Instructors. The figures for 1911 are illustrative of our findings and can be summarized as follows:

Of 311 samples examined, 245 were well waters classed as 149 shallow wells and 66 deep wells. I cannot claim that the Inspectors were justified in classifying certain wells as deep wells, as they included all drilled walls in this class, even those in fissured limestone. However, of the waters so classed 69.2 per cent. of the surface wells and 53.5 per cent. of deep wells were more or less infected with intestinal bacteria. Of the waters from springs there were 42 samples and of these 57.1 per cent. were similarly infected. While the balance, some 24 samples, were from small rivers or creeks or from lakes open to shore pollution, the water being drawn as a rule close to shore and of these samples 75 per cent. were infected. I have grouped in tabular form the results of the analyses and have arbitrarily divided the waters into five classes, viz., good, passable, slightly contaminated, quite contaminated and grossly contaminated. Good waters are such as had a comparatively low bacterial count and were free from colon and colonoid bacteria or putrefactive species. Passable waters were such as were free from colon bacilli or typical putrefactive bacteria such as B. vulgaris, but might contain some dextrose fermenting bacteria and count be fairly high. Slightly contaminated were samples showing colon or colonoid bacilli or typical putrefactive bacteria in 1 c.c. lots, not in 1-10 c.c. and bacterial count at same time moderately low. Quite contaminated samples were such as showed colon or colonoid bacilli, at least 10 per c.c.; while grossly contaminated samples were ones showing these bacteria along with a general high bacterial count. As will be noted the division is arbitrary and some difficulty at times arose just which class to put sample in. However, especially in contaminated class the physical characters of sample and the chlorine estimation assisted in the determination.

From a study of Table I it will be at once apparent that proper protection of well mouth and of immediately surrounding soil reduces very materially the percentage of contaminated waters and assures a fairly high percentage of safe waters, while lack of such protection increases markedly the chances of contamination, in fact makes contamination almost certain.

A very similar finding can be recorded for the spring waters examined as seen in Table II. Thus in springs protected in apparently good manner 77.7 per cent. proved safe waters, 72 per cent. being classed as good waters; while of the waters derived from unprotected springs only 16.6 per cent. proved safe waters.

The Remedy.—As our water supplies must very largely continue to be derived from surface and deep wells how can we remedy the conditions met with?

In some cases the situation of the well is such that no remedy is available. A

new source of water supply must be obtained. In such a case care should be taken as to the location of the well. Keep it as far as possible from sources of soil pollution. If the general dip or trend of country is kept in mind such a location would be on the upper side of flow so that even if soil became polluted the water would tend to flow away from well. Next to location, great care should be exercised to see that soil about well is kept clean, free from manure, slop water or other refuse. Most important of all would be the proper protection of the well. This is best effected by having the upper six feet of the well curbing cemented, the well mouth built up above surroundings and covered with a cement platform. Further a cement platform should surround the well for 4 to 6 feet, the fall being away from well mouth.

In a deep well the cement curbing or like means of protection should be carried down to first impermeable stratum. By adoption of such precautions we can, in the majority of cases, provide a reasonably safe source of water supply greatly to the advantage of the health of the rural community and vastly to the improvement of our factory and creamery product. The remedy is not expensive, it is mainly preventive in character, not curative, hence must be applied as soon as possible.

TABLE I

| Bacterial Character of Well Waters | No. 1 | | No. 2 | | No. 3 | | No. 4 | | No. 5 | | No. 6 | No. 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Surface | Deep | Surface | Deep | Surface | Deep | Surface | Deep | Surface | Deep | Surface | Surface | Total |
| Good | 15 | 16 | 2 | 1 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 39 |
| Passable | 10 | 16 | 4 | 2 | 1 | 0 | 6 | 8 | 2 | 1 | 2 | 0 | 52 |
| Slightly Contaminated | 4 | 3 | 12 | 12 | 0 | 0 | 1 | 0 | 3 | 1 | 2 | 1 | 39 |
| Quite Contaminated | 4 | 4 | 18 | 18 | 2 | 1 | 3 | 1 | 13 | 9 | 11 | 2 | 86 |
| Grossly Contaminated | 0 | 2 | 11 | 1 | 6 | 1 | 0 | 0 | 2 | 0 | 5 | 1 | 29 |
| Totals | 33 | 41 | 47 | 34 | 9 | 2 | 12 | 11 | 20 | 11 | 20 | 5 | 245 |

Good or Passable

166 Samples
- No. 1, Mouth of well elevated, properly protected ..... 77% safe waters
- No. 2, Mouth of well elevated, poorly protected ..... 11% safe waters
- No. 3, Mouth of well elevated, not protected (uncovered) ..... 9% safe waters

74 Samples
- No. 4, Mouth of well not elevated, but properly protected ..... 78.2% safe waters
- No. 5, Mouth of well not elevated, poorly protected ..... 10% safe waters
- No. 6, Mouth of well not elevated, not protected ..... 10% safe waters

5 Samples No. 7. No data on which to base conclusions .....

TABLE II

| Bacterial Character of Water | Springs Protected | Springs Unprotected | Streams, Creeks and small Rivers | Lakes and large Rivers | Totals |
|---|---|---|---|---|---|
| Good | 13 | 2 | 2 | 2 | 19 |
| Passable | 1 | 2 | 0 | 2 | 5 |
| Slightly contaminated | 3 | 6 | 4 | 1 | 14 |
| Quite contaminated | 0 | 11 | 9 | 2 | 22 |
| Grossly contaminated | 1 | 3 | 2 | 0 | 6 |
| Totals | 18 | 24 | 17 | 7 | 66 |

18 Protected Springs =77.7% safe waters
24 Unprotected Springs=16.6% safe waters
24 Creeks, Lakes, etc.=25% safe waters

## THE RURAL PROBLEM.

GEO. A. PUTNAM, TORONTO.

You dairyman have made money and will continue to make money, and I appeal to you upon this occasion because it requires money, among other things, to make it possible for the youth of our land in the rural districts to enjoy those advantages, social, educational and economic, which makes towards intelligent, efficient, vigorous, industrious, public-spirited manhood and womanhood, in which dairymen and farmers of all classes should be interested. We require money for these things, and we must have also a condition which is represented in your industry to a greater extent than in any other agricultural activity, *i.e.,* co-operation. It is possible, I think, to give you too much credit for the degree of co-operation exemplified in your dairy activities, for it is practically impossible to develop the dairy industry beyond a certain degree and be assured of profits without applying the principal of co-operation. You have followed this method in your work of necessity rather than choice. The principle of co-operation was closely adhered to in the earlier years of the industry. I am afraid that the lack of the true co-operative principle in some departments of the industry of the present day will tend towards a greater fluctuation in prices. However, you know the advantages of co-operation, having worked it out successfully in the dairy industry, and should be able and willing to co-operate along other lines. In the plans which I shall briefly outline we desire more than any other one thing that the spirit of "All for the good of each, and each for the good of all," shall be the guiding principle.

Among the things desirable for the rural districts, and in which you, as dairymen, may assist by your influence and financial support, are the following:—

RURAL SCHOOLS: Good teachers; attractive surroundings; sanitary, comfortable buildings; proper equipment; medical inspection; consolidation.

LIBRARIES: Public libraries where possible; travelling libraries; reading circles; debating clubs.

COMMUNITY IMPROVEMENT: Civic pride; attractive factories and surroundings.

The educational, social and economic attractions of the cities have drawn all too heavily upon the population of the rural districts. What can you do to make possible in the villages, towns, and rural communities those advantages which will mean:

Better Educational Advantages.
Added Comforts to Home Life.
A Better Social Life.
A Loyal Community Spirit.
A Healthier People.

By making all of these possible you will have done much to induce those who are on the land to remain there and to draw a better class from the cities to the farm; and it is only the most industrious, who have had some experience on the farm, that should be encouraged to return to the land in the meantime.

I fancy I hear some of the older heads saying, "Young man, you are theorizing." Not so, for has not the Women's Institutes throughout the Province done, or succeeded in getting others to do, many of the things which I have suggested. They need the help of you men to continue the good work which has been so well commenced in many parts of Eastern Ontario.

Last fall for the first time we held a Convention of the Women's Institutes of

Eastern Ontario in Ottawa, and as a result of the splendid activities reported upon at that Convention in the seventy branches in the territory represented, we look for a considerable extension of the organization throughout the east during the coming season. You, as Dairymen, are looked upon as, and are, influential men in your respective localities, and we appeal to you on this occasion to lend your influence to the establishment of Women's Institutes where such do not now exist. Send us the names of women who should be interested, and we will supply them with literature bearing upon the work with a view to sending experienced workers to organize later.

Let us consider for a few minutes the activities of these Institutes which have come into such favorable prominence within the last few strenuous months. I refer to the Women's Institutes, an organization which is now represented by about twenty-five thousand members, and some 840 branches in Ontario, and which have responded so nobly to the appeal, first, to subscribe to the Hospital Ship Fund, then to support the work of the Red Cross Society and Belgian Relief. It will be of interest to you to know that the Women's Institutes donated something over five thousand dollars to the Hospital Ship Fund—about twenty-five thousand dollars in cash and many thousands of dollars' worth of socks, caps, shirts, etc., to the Red Cross Society. They are continuing their good work in support of the Red Cross, and are responding most liberally to the Belgian Relief. Only the other day I heard of an Institute that had been instrumental in collecting in a very small territory three thousand dollars' worth of clothing and goods to be sent to the Belgians. Another small Institute has donated $300 in cash and is still collecting. This organization has not in the midst of all this special work failed to do its part in relieving local distress.

You may think that the Women's Institutes have been inspired by a new spirit since the commencement of the great world conflict. They have merely developed that spirit which has characterized their work from the beginning. What else could you expect of a band of women who have for the past eight or ten years, and a few for fourteen or fifteen years, been asking themselves from month to month and from season to season, "What can we do for the benefit of the individual and the family by way of providing good lecturers, better literature, healthful social conditions? How can we increase efficiency in our homes; what is our part in conserving the health of the community; how are we to look to the wants of the household in the most efficient, economical way; who are the needy among us and what can we do for them?" etc., etc.

I must not go into detail as to what the Women's Institutes are doing by way of holding monthly meetings for the study of their home problems in their own way, of conducting systematic courses of study in Food Values and Cooking, Sewing, and home nursing; providing wholesome amusement and entertainment for the community; encouraging sociability among all classes and sects of the community; establishing rest-rooms and reading-rooms; looking to the proper ventilation and sanitation of the schools; encouraging school gardens; endeavoring to secure Medical School Inspection; in short, doing anything and everything which makes towards the realization of their motto: "For Home and Country."

In the doing of all these things it is not only that certain things have been accomplished, but a spirit of community loyalty has been created; and when you go to the rural districts where Women's Institutes have existed for some years, you don't hear so much as formerly about the young people leaving the locality permanently, but plans are being made for a permanency in local institutions and organizations.

I would ask you, as dairymen and public men, to see that the public schools are more efficient and thorough. Instead of asking yourself, if you are a school trustee, "How can we manage this school at the minimum of cost?" you should say to yourself, "How can we spend money to the best advantage of the rising generation?" If you have a good teacher, and you are paying him or her $500 a year, and if you have an opportunity of securing another for $450, you should not say to yourselves, "We have an opportunity of saving $50," but you should say, "We have a good teacher; he is in touch with the work of the school, and he knows the pupils, and it would not be economy to get another teacher merely for the sake of saving $50." Look to it that the schools in your district are made attractive. A great deal of good has been done through the School Fairs and School Gardens to make country schools a little more attractive, and you men of the country districts should do your part in making the centres in which the children of Canada spend so much of their time attractive, sanitary, healthful, and elevating in every respect.

Only last week I got a letter from a lady in one of the Eastern sections of the Province stating that the Women's Institute had appointed a committee to wait upon the trustees to draw to their attention defects in the water supply, and they had it improved; but they did not secure all they desired. I would like to see the men co-operate with the women in these matters.

See that your factories are placed in better sanitary conditions. Use a little paint and see that everything is tidy, so that they will be a joy to those who pass by. I venture to say that if you spend $25 in this way, those who are drawing milk and visiting your factory from day to day will, through force of example, spend many times that amount in making their own places more attractive.

Through the Women's Institutes co-operating with the Department of Health and my own Department in Toronto, we have had some of our regular workers undertake medical inspection of schools, and we have shown that there is a greater need for inspection of schools in the rural districts than there is in the towns and cities. Regulations have been adopted whereby medical inspection may be undertaken in the rural districts as well as in the city. There is the handicap that there is no support given by way of finances, and medical inspection in the rural districts is more expensive than in the city, because there are so few pupils at each school. I do not think you will find one town or city in the Province that has medical inspection of the schools that would think of giving it up. It may be that an appeal will be made to some of you through the Women's Institutes for a little financial assistance to carry on such work. One of the Women's Institutes, near Ottawa, as a result of a convention held in that city last November, where Dr. MacMurchy spoke on "Medical School Inspection," has introduced teeth cleaning in the schools with splendid results.

The speaker referred at some length to the activities of the Women's Institutes, a full report of which can be secured by applying to the Department of Agriculture, Toronto.

The Institutes have been active along patriotic lines this season, having contributed over $30,000 in cash to the Red Cross.

An appeal has been sent to them to support the Belgian Relief, and they are responding in a splendid way. One branch sent in $3,000 worth of food material and supplies. Another Institute, which was in a small village, sent in $300 in cash, and they had already responded to the Red Cross work.

The dairymen will never do the work they should until they have their local

organizations as the women have. I think you might well take a lesson from what the women have been able to do and what the men have done in 225 sections of the Province in forming local Farmers' Clubs. I think you have had sufficient examples in that respect to lead you to conclude that local organizations can accomplish a great deal. The Women's Institutes are now saying, "How can we make this community efficient and effective within itself?" That is a splendid sign of the times, and I think the business people and the professional people are going to appreciate the value of the rural resident in the permanent prosperity of the country. You may rest assured, as farmers, that you will be in a much stronger position now to ask for the co-operation of those in political authority to assist you in those lines of work which can be undertaken to the benefit of not only the farming community, but to the permanent prosperity of the whole nation.

Mr. Beach, of Iroquois, exhibited a new form of cheesebox, which can be shipped in the knocked-down condition, 7,000 to a car. For full particulars apply to Mr. Beach.

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## SECRETARY'S REPORT.

T. A. Thompson, Almonte.

The year 1914 has been a most successful one for those engaged in the dairy industry, and slowly but surely are the objects for which this Association was inaugurated being attained. The untiring persistency with which the Dairy Instruction work under the supervision of Mr. G. G. Publow is being carried on in Eastern Ontario is bound ultimately to raise the industry to the very highest plane.

Year by year our dairy farmers are being educated through the meetings held by this Association in the various districts as to the best methods of breeding, feeding, and caring for their dairy herds, as well as to the most economic methods of production and scientific care of milk, all of which is having a decided effect on the quality of the dairy products manufactured in Eastern Ontario.

This Association, since its conception some thirty-eight years ago, has had, laboring within its ranks, some of Eastern Ontario's brightest sons, who have devoted much of their time and energy to the building up this industry and placing it in the proud position it occupies to-day.

The debt of gratitude we owe to the early promoters of the dairy interests (some of whom we have still with us) can only be conceived when we review the progress made and the obstacles overcome.

A great responsibility therefore rests on the younger members of the Association. They must take up the work where their predecessors left it off, and by persistent, untiring efforts carry it to a successful issue. We are still far from the goal. The great educational work carried on by this Association has alone been made possible by the financial assistance received year by year from the Department of Agriculture of this province, augmented by the invaluable services rendered by Mr. Geo. A. Putnam, Director of Dairying, who has enthusiastically supported every measure introduced for the promotion of the dairy interests.

The Association is also indebted to Mr. J. A. Ruddick, Dairy Commissioner at Ottawa, for the keen interest taken in the educational work and the many favours received from both himself and his highly efficient staff.

The Kingston Dairy School, presided over by Mr. L. A. Zufelt, is doing a splendid work in educating the makers along certain scientific and economical lines. The Directors of this Association deeply regret that they have been financially unable to hold a Dairy Exhibit in connection with this Convention, as the exhibit held a year ago was an unqualified success, both as to its educational features and the quantity and quality of the goods exhibited.

During the months of November and December in each year a mass dairy meeting is held in each of the several Dairy Divisions, and by this means much valuable information is being disseminated. At these meetings the following gentlemen were nominated to comprise the Board of Directors for the year 1915, and I trust that the selections which were made by the voice of the people in the various districts will be indorsed by the members of this Association.

I wish to tender my sincere thanks to the President and Board of Directors for their kindness and forbearance and the assistance rendered me in the discharge of my duties as Secretary.

Moved by MR. DILWORTH, seconded by MR. ALEXANDER, that the Secretary's report be received and adopted.

MR. SAMUEL ARMSTRONG: I move in amendment that the report be adopted, with the exception that Mr. Smith be substituted for Mr. Payne.

MR. FREE: I move an amendment to the amendment that the former director, Mr. Campbell, be elected.

MR. SMITH: I take pleasure in seconding that motion.

The amendment to the amendment carried.

Moved by MR. LEGGETT, seconded by MR. STONE, that the Secretary's Report, as amended, be adopted. Carried.

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## REPORT OF RESOLUTIONS COMMITTEE.

The following report of the Nomination Committee was read by J. N. STONE, Chairman:

1. That we, the members of this Association desire to express our appreciation of the kindness of the Mayor and citizens for the reception given the members of this Association.

2. That we the members of this Association are opposed to the passing of legislation as recommended by the Canadian Freight Association regarding the specification of cheese boxes, but would rather recommend that more attention be paid by box manufacturers in the selection of timber used and the proper seasoning of same.

3. That we the members of this Association desire to thank the speakers of this Convention for the splendid addresses given and their assistance in making our Convention a success.

4. That the thanks of this Association is hereby tendered to the Canadian Salt Company, of Windsor, Ontario, through its general manager, Mr. C. G. Henderson, for the very handsome badges presented by the company to the Association.

5. That recognizing the great benefits derived from the dairy industry, by the assistance from both the Ontario and Federal Departments of Agriculture, we wish to express our sincere thanks and appreciation of the work done by their Departments.

After some discussion it was recommended that dairy experts adopt some one of the plans of grading cream and butter recommended by Mr. G. H. Barr.

Moved by MR. GLENDINNING, seconded by MR. GILLESPIE, "That this Convention recommend a conference of creamery men of Eastern and Western Ontario to be held in the City of Toronto to discuss the advisability of paying for cream according to grade." Carried.

J. R. DARGAVEL, M.L.A., Honorary-President, presiding, said: Since I have come to Peterboro, some have asked me, "What is the Dairymen's Association for? What is it doing?" That is a pretty large question and is entitled to a very lengthy reply and if I were to tell you all that they have done and all they are striving to do, it would take all evening. The work of the Dairymen's Association is bound up with the other work of agricultural betterment, and it is the agriculture of this country that keeps every wheel turning in your city to-day. If it were not for the progress made in agriculture in Ontario, in the past few years, your city would not have a population of 19,000, and the farmers of this country would not have the luxuries that they have to-day. It is unfortunate that the work of this Association has not received more attention from the citizens of this city and the people in the surrounding country. There is no way that money can be used to better advantage than in promoting the advancement of agriculture, and every dollar that is wisely used for that purpose will be $100 in the pockets of the husbandmen of this country.

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## ADDRESS.

G. A. GILLESPIE, M.L.A., PETERBORO.

I am very much disappointed in the attendance at these meetings. We have gone to considerable expense and trouble in bringing to this city this Convention, and we have had men of national reputation, the best men that Canada produces, give addresses from this platform for the past two days, and we have had very small audiences. The only reason I can give for it is that there is a poultry show at the present time, and to-night we have a meeting of the Home Guard which is possibly one thousand strong.

As never before, we, in the city of Peterboro, realize the importance of increasing the production of agriculture, and there is no place in the Province of Ontario that it appeals to more forcefully than right around the city of Peterboro. I am in a position to know whereof I speak, because we have had two of the worst years that we have ever had in the dairy business in this district, and the citizens of Peterboro and the farmers are feeling it. The climatic conditions have been so much against them during the past two years, that it has been impossible to get a crop, and we have suffered severely. A great many of the dairymen have cut down their herds because they have not had enough food to carry them through, and many of them to-day are not producing any milk at all. If I were to tell you that at the present time we are practically closed down in butter making in this city, you would realize the situation we are in, and we may have to import butter before the winter is over. That is just as serious a condition for the consumer as it is for the producer, because if we have to pay exorbitant prices, it means something to the citizens.

## PRESENT-DAY AGRICULTURE.

Prof. J. B. Reynolds, M.A., Ontario Agricultural College, Guelph.

Notwithstanding all that is being said to-day about increasing opportunities in farming, about farming as "a profession," and the farmer's "noble occupation," it remains true that very few farmers are prominent citizens, very few enter public life, and most of them are forced to be content with small returns for their labor. A farmer near Guelph told me, in answer to a direct question, that his total sales from a farm of 75 acres amounted, taking one year with another, to $600, or $8 an acre. He said, moreover, that he was doing better than many of his neighbors. He probably under-estimated his income. As a matter of fact a farmer cannot be trusted in a statement of this kind. Not that he wishes to deceive, nor that he won't tell, but that he can't tell—he doesn't know. When I was teaching school I tried to screw out of my trustee board a raise of ten dollars on my salary—I was then receiving $375 a year. I pleaded that I could hardly save anything on that salary. One of the trustees retorted that $375 was more than he ever got in any one year. And yet that same farmer to-day owns, or has given to his sons, between 300 and 400 acres of the best land in that district. I boarded in his house for a year. His family lived well, that I can vouch for. He gave his three sons and one daughter a musical training good for all local purposes. He gave them all the schooling they wanted, which, however, did not go beyond the public school. And he did all this in thirty years, according to his own story on an income of less than $375 a year. It is a remarkable instance of thrift.

Quite recently a number of printed questions have been submitted to the students in attendance at the Ontario Agricultural College—questions chiefly relating to this: did they intend to follow actual farming after leaving the college, and if so, why? If not, why? Of over 150 who have replied thus far, 100 were born on farms, 89 of them in Ontario. The question then was, for the majority of them, did they intend following the life into which they were born, or abandoning it? I would have you observe that, while an agricultural education may be supposed to prepare men for farming, it does not follow that all who enjoy the benefits of that education become farmers. This is a free country, and it is one of the consequences of our freedom that we are disposed to choose our own occupation, and not have our occupation thrust upon us. Many of these young men, born on the farm, and now acquiring an education that should help to make them successful farmers, have somehow learned that there are disabilities in farming that make the prospect of it distasteful to them. And I am going to give you some of the reasons for that distaste, reasons stated by themselves. I would have you pay earnest heed to the opinions of these boys, some of them your own sons or sons of your neighbors. The answers were given seriously, and are an honest and candid expression of feeling on a matter no less important than the choice of an occupation. Of those who find farm life distasteful, 33 mention long hours as a reason; 24, too much grind, no opportunity for amusement and recreation; 17, poor returns; 13, lack of capital; 10, lack of labor; 7, lack of conveniences; 4, Sunday work. These reasons, you will observe, are chiefly economic, questions of labor, capital, hours of employment, and expenditure for convenience in house and barn. There are social reasons given likewise, but we have not time to deal with them now.

I think you will agree with me in admitting that, as farming goes in Ontario at least, most of these objections are well taken. The conditions referred to

are all too common. Working from daylight to dark is the traditional practice. It seems a kind of superstition in the minds of many farmers that the farm would go to ruin if they and their sons and hired men were not hustling around somewhere on the farm while there is daylight. Perhaps I may be permitted to testify from a limited, though, I believe, a sufficient experience of three summers in managing a farm that these long hours are quite unnecessary. Chores should be reduced to a minimum in the summer. For instance, cows should freshen in the fall instead of in the spring, and thus the work of milking is made light as possible in the summer months. Nor can the subterfuge of quitting outside work at six o'clock, and leaving the milking and other little items to be done afterwards, be commended. The work of the farm can be kept up to date, by quitting in time to do the chores before six o'clock. I am sometimes asked what I should do if I were alone, without help, or with insufficient help, on a 75-acre or a 100-acre farm, where it would be physically impossible to do the work in ten or twelve hours a day. My reply has been that I would either manage the farm so that I could afford to employ sufficient help, or quit the job, and look for some other in which I could find some comfort in life. No man ought to be a slave to his work, or expect others to be slaves. Long hours are more often a habit than a necessity. As to boys on the farm, sport and recreation are a need of their nature, and a right that ought not to be denied.

The incessant drudgery of chores in the barn and of housework in the home, may be greatly lightened by conveniences. The monotony of the never-ending task is felt by the women and girls on the farm, even more than by the men and the boys. And the discontent with farm life is proportionate. In scarcely any realm of human activity has the inventive faculty of man done more to lighten and to expedite work than in farming. We have instead of the reaping hook and the laborious methods of binding the grain by hand, the marvellous ingenuity of the self-binder. We have machines for loading, and fork and slings for unloading. We have the potato planter and the potato digger. We have, instead of the poverty-stick of long ago, the capacious maw of the steam-thresher, with its wonderful digestive apparatus. We have the milking machine and the power-driven cream separator, and yet, in spite of all these and other devices, on many farms chores are still done under the old-fashioned inconveniences. The water supply is still rods away from both house and barn, and stabling and feeding still done with the maximum of labor. It seems to argue on the part of the farmer a want of faith in his calling, a want of reliance on its resources, to worry along year after year without stabling arrangements and a water system which brings the water to the barn and to the house. A farmer who is a disciple of the new agriculture will reason like this: "A water system, for example, will increase the opportunities for leisure, and add to the permanent satisfaction of farm life. The work both indoors and out is arduous enough at the best and if I can lighten it I will, whether the process will enable me to make more money or not. My business ought to be good enough to enable me to afford these conveniences. My family and I work hard enough to deserve them, and I am going to have them." A man who has the courage and faith to act upon this thought, will likely have resourcefulness enough to make his farm pay for it.

To return now to those questions and answers already referred to, let us examine the replies to this question: "What features of farm life would induce you to live on the farm instead of in the city?" The replies may be summarized in part as follows: Love of the open air, 13; independence, 10; health, 8; love

of nature, 4; free life, 3; happiness, 2; aptitude or liking for farming, 11; dislike of business life or city life, 6; opportunities offered by the new agriculture, 2; because it is the coming occupation, 1; because it is profitable, 1; opportunity to make a good living, 1; expectation of plentiful returns (with "expectation" underlined), 2; because city people work for the money, country people for the work, 1; a great field for service, 2.

I would have you observe the significance of these replies. They are especially significant when we remember that 112 out of 150 of these young men replied that they intended to farm immediately after leaving college or later when they had gained some capital. Only four replies emphasize the profitableness of farming. Evidently the expectations of the majority in this regard are moderate. What then, are the attractions which farm life offers to them? These attractions are mainly sentimental—sentimental in the best sense of the word—happiness, love of the free life, love of nature, faith in present-day developments in agriculture, the serviceableness of agriculture. Surely we all fervently hope that their fine idealism will not be shattered by encountering too stern realities. There are thousands in Canada like these boys, cherishing sentiments and tastes favorable to country life, but repelled from it by practical difficulties and disabilities. So that the question resolves itself, in the last analysis, into an economic one. If they can be assured of a modest income, of freedom not from hard work but from slavery, of reasonable opportunity for cultivating their minds and their social instincts—all right and worthy demands upon life—these boys would be satisfied to follow farming. I wish now to examine the economic question in detail.

Let us take a particular instance of a 100-acre farm, fairly productive, well equipped and well managed. We shall not give it any special advantages of situation, nor suppose that it is run on the intensive plan, nor that it is stocked with a pure-bred herd of cattle. A general farm will serve our purpose with a herd of graded cows, but of superior cows because it is run by a capable farmer. The farm equipment is good for the same reason. What will be the capital investment on such a farm?

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|---|---|
| 100 acres of land, including 3 acres of orchard | $4,000 |
| 2 houses | 3,000 |
| Barn, stables, implement shed, poultry houses | 2,000 |
| Waterworks | 300 |
| 15 cows at $80 | 1,200 |
| 4 horses at $150 | 600 |
| Brood sows | 200 |
| Poultry | 100 |
| Implements | 600 |
| | $12,000 |

What charges, now, may we expect such a farm and equipment to be capable of supporting? Or to put it in another way, what propects does it offer to a young man who has $12,000 to invest, or a fair proportion of it. and is about to choose between farming and some other occupation? We shall take it for granted that he is a young man with a liking for farming, has had some farming experience, has gained some knowledge of scientific agriculture. Suppose that he is offered a position as District Representative for the Department of Agriculture, or a position on the staff of a farm journal at a salary of $1,000 or $1,200 a year. How many of you—you who are successful farmers and know what

profits you are making, how many of you would advise him to invest his money and his life in a $12,000 farm equipment. From this point of view let us see what charges such a farm should support.

| | |
|---|---|
| Wages, married man, per year | $450 |
| Threshing, silo-filling and occasional labor | 150 |
| Feed (concentrates for milking cows) | 200 |
| Taxes | 50 |
| Seed (clover, corn, turnips, garden seed) | 65 |
| General expenses (blacksmith, veterinary, etc.) | 75 |
| Insurance | 10 |
| Depreciation on buildings and implements, $5,600 at 5% | 280 |
| Interest on $12,000 at 6% | 720 |
| Proprietor's labor income | 1,000 |
| Total | $3,000 |

Here we have a gross expenditure of $30 an acre for a general farm of 100 acres. From the point of view of the Guelph farmer referred to previously, who stated his gross income at $8 an acre, this is pretty high. But I maintain that if the present-day agriculture justifies what has been done for it in scientific investigation, and what is being said for it by the advocates of farming as a desirable occupation, then such a farm should return an income to balance that expenditure of $30 an acre. To put it this way: Suppose a successful business man or manufacturer or professional man should come to you, a successful farmer, with the preceding statement of charges. He tells you that his son wants to buy a farm and follow farming as a livelihood; I know of just such an instance at the present moment. A young man whose father is in business in a large and successful way has bought a farm and is going to work it. Well, this father hands you the statement, and asks you if it is reasonable to expect that a 100-acre farm, well managed, will support a charge of $3,000 a year. What would be your reply? Some of you I am satisfied, perhaps most of you, would reply: "No, it will not stand such an expenditure or anything like it." But if you reply thus and your inquirer is convinced to your view of the case, I imagine he will say, "Well, farming may do for some, but for me and mine we will have none of it." And from the point of view of a successful business man accepting such an opinion from a successful farmer, he would, in my judgment, be quite right in his conclusion.

Perhaps we can arrive at a clearer estimate of this question if we examine some of the items in the preceding table of charges. First, there is the wages, $450 for a married man. That wage is, I admit, higher than is generally paid for farm help. It includes, of course, a house free of rent, but I would have it include no other perquisite. What the farm produces the hired man may buy for his home at cost price, or wholesale price, or market price, whatever may be agreed upon, but he must pay for what he gets. On that understanding, $450 a year and a free house is not too much to hold a capable man against the attractions of higher wages paid in town or city; but the high cash wage with no perquisites looks more attractive to a man than a lower wage with an indefinite amount in perquisites. It amounts to the same thing to the farmer, and is more satisfactory. The next questionable item is the sum of $200 for concentrates, cotton-seed meal, distillers' grains, etc. The amount, of course, may be questioned, but the principle of selling oats or barley, if you have them to sell, and buying a food richer in protein to feed to dairy cows, need not be argued at a Dairymen's Convention. Then there is the item of $280 for depreciation in buildings and implements. As a matter of fact these things do depreciate, and part of the $280 is spent each year in re-

pairing them. The balance of that sum represents a sinking fund to replace implements that are worn out, and to make alterations and improvements in buildings. The two largest items represent charges that are seldom taken into account by a farmer. If he has to pay rent, the interest charge goes out partly in that form. If he has mortgaged his farm, the interest charge goes out partly in that form. If he holds the property free of debt, he usually considers that his business is free of interest charges. But no accountant, examining a farmer's statement of proceeds and expenditures, loss and gain, would allow the interest charge to be ignored. The last item is that of $1,000 for the farmer's own labor income. The quickest way to dispose of that question is—any man able to produce an annual revenue of $3,000 from such a farm as I have described, gets his $1,000 and earns it. If he is not able to produce it, he does not get it, and perhaps does not earn it. I am convinced, however, that most young men with little capital, who would like to farm, are deterred by the fear of failure in the matter of interest charges which, with borrowed capital, are inevitable, and a labor income, which, with a growing family such as all right-minded young farmers look forward to, is essential.

I should not be doing justice to this subject if I left it without attempting to answer the question here raised, namely, can a farm be so managed as to make it pay a dividend on capital invested and a satisfactory labor-income for the owner? I happen to be able to furnish figures for the year 1913 for a farm business such as I have described, a farm of 63 acres, the return from which was a little more than $30 an acre. There was a dairy of ten graded cows that averaged 9,400 pounds of milk for the year. The whole milk was sold. No stock was sold off the place but five heifer calves were raised, not included in the estimate of proceeds. I venture to present herewith an estimate of proceeds for a 100-acre farm, based on figures in part actually obtained on the farm I have spoken of. In this estimate I suppose that the skim milk was fed on the place, and hence have included hogs in the list. I have supposed, too, that the business has been a going concern for at least three years, so that heifers raised on the place can be sold or substituted in the herd for old cows, the old cows then being sold. In these circumstances the sale of cows or heifers becames an annual source of revenue.

Statement of Proceeds from 100-Acre Farm.

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|---|---|
| Cream from 15 cows at $80 each | $1,200 |
| 6 cows at $60 each | 360 |
| Calves | 50 |
| Apples | 300 |
| Poultry and eggs | 150 |
| Hogs, 30 at $4 each, 30 at $14 each | 540 |
| General produce (potatoes and grain) | 400 |
| Total | $3,000 |

Now, if anybody says he can make a better showing than that, item by item, then so much the better for my argument. The farm I refer to did considerable better than that in the dairy, for it gave a return of $1,300 from ten cows. I have no figures from this farm for hogs, but "pigs is pigs" these days, and I have probably underestimated what may be done in this direction. For apples, I have estimated $2.50 a tree for an orchard of 120 trees. On this 63-acre farm the returns for 1913 and 1914 averaged $2.80 a tree. I have estimated $150 for poultry. The actual returns from the farm referred to in 1913 were $189.00. For general pro-

duce the estimate for 100 acres is $400.00. For the 63-acre farm in 1913 the proceeds were $269.00.

I hope I have demonstrated the possibility of securing a revenue of $3,000 a year from a 100-acre farm. To do this, however, a farmer needs to be favored with fairly good fortune in crops and in rearing stock. He must be a good farmer: that is, he must take advantage of the best known methods in crop rotation, he must sow good seed from the most productive varieties. He must prune and spray his orchard systematically and thoroughly. He must use the milk scale and the Babcock test for his dairy herd, and keep in his herd only those cows that reach a standard of production. Above all, he must be a business man. He should keep accounts so that he knows where he stands at the end of each year, where his profits and where his losses have been. He must understand methods of selling so as to make the most of his produce. All this is what I understand by present-day agriculture.

## FOOD VALUE OF MILK AND ITS PRODUCTS.

Prof. R. Harcourt, Agricultural College, Guelph, delivered an address on the above subject. This has been published in bulletin form (No. 221), and can be secured by applying to Department of Agriculture, Toronto.

# Dairymen's Association of Western Ontario

The Forty-eighth Annual Meeting of the Dairymen's Association of Western Ontario was held in the Engineers' Building, St. Thomas, on the 13th and 17th of January, 1915, and proved to be one of the best and most largely attended conventions held.

## PRESIDENT'S ADDRESS.

J. B. Muir, Ingersoll.

As President, it gives me pleasure to welcome you to this, the Forty-eighth Annual Convention of the Western Ontario Dairymen's Association, in the city of St. Thomas.

We well remember some splendid meetings at previous conventions held in this city, and trust that the addresses given and discussions thereon at this convention may be a stimulus, particularly to the people in this county, to increase their herds of dairy cows, as they are the greatest mortgage lifters in this Province to-day.

The year just closed has been unique, as the highest average prices (about 13½c. for the season) ever given for cheese in this country were paid the patrons of cheese factories in 1914. While we all regret exceedingly the cause that led to the extra demand from England during the latter part of the season, the fact remains that they wanted all the cheese there was to offer, and stocks are lower to-day than they have ever been in Canada at this date since the very early days of the industry.

I think we may look forward with every confidence to the future, as the markets are assured and good prices for all the cheese we can produce.

With the decrease in the production of cheese, and the very large increase in the production of butter, from about 9,000,000 lbs. in 1905 to over 20,600,000 lbs. in 1913, and the Western Provinces developing very rapidly along dairy lines, especially butter-making (Manitoba last year increased her production of milk by about 50 per cent., which largely went into butter, the time may have arrived for dairymen in sections where, for several years, they have been turning from cheese to butter, to seriously consider if it would not be in their best interests to go back to cheese-making again.

To the butter-makers and patrons of creameries, I want to say frankly that we are not producing the quality that the western part of this banner dairy Province is capable of, and I do hope that an earnest effort will be put forth by everyone connected with the butter business during the coming season to make a very great improvement. "It's a long way to Tipperary"—and it's a long way to perfection in the quality of our Western Ontario butter, but if everyone will do his or her share, this year the results will be astonishing and will add dollars to the pockets of the patrons. I also want some of our live butter-makers to see that there is an exhibit at Toronto next fall that will not allow Quebec and Alberta exhibitors to carry off practically all the prizes, as they did last year. This was not a credit to Western Ontario, and I have confidence our makers will see to it that it does not happen again.

Exports of cheese are only about 91,000 boxes less than last year, and when we consider that the number of cattle that were shipped out of the country during the fall of 1913, the decrease is not so great as may be expected, and I do not share the fear of some, that we are in a few years going to disappear from our proud position in the British cheese market. With the increasing use of electricity on the farm and the milking machine, herds of dairy cows will be largely increased, and Western Ontario will continue to make the best cheese on earth in large quantities, which the Britisher will be glad to buy at good prices.

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## DIRECTORS' REPORT, 1914.

Your Directors are pleased to report that the season just closed has been profitable for dairymen. A number of dairy cows were disposed of in the fall of 1913, but, as pointed out in a previous report, many of these animals are inferior milkers and consequently there was not the decrease in the output of the herds that was anticipated in some quarters.

Western Ontario was favored last season with good climatic conditions, and the output of the cheese factories and creameries was well maintained.

A large number of young stock were raised the past year, and there is every probability that any herds which may to some extent have been depleted will be restocked in the near future.

Little appreciable increase has been observed in the export of milk; some cream has been exported from the South-Western Peninsula. The home market and the export trade in finished products absorbed the output.

Early spring conditions were much more favorable than in 1913, and the fall output was considerably increased over that of the previous year. This increase was assisted by the temporary closing of several Milk Condensers, thus turning a large quantity of fall milk into cheese-making.

Prices for Dairy Products.—The average price for cheese during the past season has been the highest ever reached in Canada. During the early part of the season prices were not quite as high as anticipated, but immediately on the outbreak of war prices increased and have since been maintained at a high level. Although we may regret exceedingly the lamentable cause of the rise in prices, it must be admitted that milk-producers have been benefited.

The butter market during the early part of the season was "weak" and "draggy." The demand from the Western Provinces fell off somewhat owing to financial conditions and from the fact that these Provinces are increasing their output of butter from year to year. Later in the season prices stiffened, the market became active and the latter part of the season gave satisfactory results.

The statistical position of both cheese and butter is strong, and the prospects for 1915 are very encouraging.

Membership.—Your Association has a membership of 314. Subscription to "Farm and Dairy" is included in the membership fee of $1.

Special Officer.—A special officer was again employed to deal with cases of deterioration of milk. Eight cases only were reported, which indicates that the deliberate violation of the law on this point is becoming a thing of the past. The Association is in debt to this work for 1914 to the amount of $180.45. Your directors respectfully recommend to the incoming Board to continue if possible this system.

Dairy Herd Competition.—On account of the necessity for strict economy under war conditions, your Directors were unable to donate the usual cash prizes for this competition. It was also necessary to withdraw one section in each class, leaving two classes only. The Canadian Salt Company and Ryrie Bros. very kindly donated silver cups and medals respectively, and these were offered as prizes. We are pleased to report a very satisfactory entry in Class 1 (cheese factory patrons), and regret that no entries were received in Class 2 (creamery patrons). The standard has again been raised, the production per cow being greater in each of the winning entries than that of last year. A full report will be submitted.

Dairy Exhibition.—As previously mentioned, owing to the necessity for strict economy under the financial conditions brought about by the war in Europe, our Provincial Grant for 1915 will be decreased by several hundred dollars. However we may regret the cause for this decrease, we appreciate very much indeed the amount allowed us under existing conditions.

Under these circumstances, your Directors were able to donate only within $100 the usual amount of prize money for the Dairy Exhibition. We believe the exhibitors appreciate the situation and realize the necessity for this reduction in the prize money. The less amount of money offered for prizes has not, we are pleased to say, dampened to any appreciable extent the enthusiasm of the exhibitors, and it is hoped that next year, should the exhibition be continued, a much larger exhibit will be put up by our cheese and butter-makers.

In our opinion the Dairy Exhibition should receive the hearty support of all factorymen. It has not only assisted in improving the quality of our cheese, but has been in addition a factor in extensively advertising in the home market.

Our thanks is especially due to all those who contributed special prizes. Without these "Specials" it would have been more difficult to carry on the exhibition as usual. We respectfully recommend to the incoming Board of Directors to continue, if possible, the Dairy Exhibition.

Factory Improvements.—Unfortunately, several cheese factories were burned during the past year, but a number of these will be rebuilt. A few new creameries were opened, and we believe the factory buildings are being improved as rapidly as conditions and funds will permit.

Instruction Work.—The work of dairy instruction carried on by the Ontario Department of Agriculture in co-operation with your Association, is a commendable factor in securing further improvement in the milk and cream supply, as well as in the finished products. A report will be submitted by the Chief Instructor.

Speakers for Annual Meetings.—The Dairy Branch of the Department of Agriculture again sent speakers to the Annual Factory Meetings. This plan is more appreciated each year and is giving good results. The work will be continued during the present winter.

Legislation.—The Dominion Parliament passed an Act at the last session known as the Dairy Industry Act. This Act covers most of the Dairy Legislation made necessary by the changed conditions of Canadian dairying. The new Act should meet with the approval of all dairymen.

Board Meetings.—Your Directors have endeavored to transact the business of the Association to the best of their ability. We appreciate the assistance given us by the Ontario Department of Agriculture to further the dairy interests in this Province. The aim of dairy instruction and of your Association is to place the industry on a solid basis and endeavor to keep the quality of dairy products second to none.

Outlook.—Present indications point to a strong future demand at remunerative prices for all dairy products that can be produced in Canada.

The Factory Situation.—Under the present changed conditions, we believe the milk producers in certain sections realize as never before the necessity for keeping the cheese factories and creameries in operation, and it would seem that in these sections at least it would be to the future benefit of both producers and manufacturers if some co operative plan regarding the milk supply could be worked out between the cheese and butter manufacturers and the manufacturers of other dairy products.

Attention is also called to the matter of shipping cream out of the country, and we ask the question, "Will it, in the final analysis, pay the producers in certain localities to withdraw their patronage, thus eventually putting the home factory out of business, for a possible present advantage, but a probable future uncertainty?" The above points we respectfully submit for the serious consideration of milk and cream producers.

The Dairymen's Patriotic Fund.—Shortly after the outbreak of the war, your Directors decided to take some action in connection with raising a Patriotic Fund to be identified entirely with the Dairy Industry.

It was felt that it was our duty as dairymen to do anything possible to assist the various funds organized for the purpose of relieving distress, not only of some of the families of the brave men who have gone to the front to fight the battles of the Empire, but, in addition, to assist as far as possible the Red Cross and the Belgian Relief Funds.

With a view to bringing this matter before the dairymen of Western Ontario, the Secretary was instructed to send out circular letters to the factorymen, suggesting a voluntary contribution on the part of the patrons of one day's milk and cream or any portion thereof, and on the part of the factorymen and others one day's pay or any portion thereof.

The Association undertook, through the Secretary, to receive all contributions, acknowledge the same, issue a statement showing the amount contributed, and when the fund was completed to turn over the amount received to the funds approved of by the Dominion military authorities, this work to be done without any charge or expense whatever.

We are pleased to report that the response has been liberal, and a total fund amounting to $4,532.88 has been received. We wish to take the opportunity of expressing our appreciation of the contributions of the patrons of the various factories and individuals to the Dairymen's Patriotic Fund. A full report will be published and copies forwarded to the secretaries of the different factories.

The President: I have a telegram which reads: "The Nova Scotia Dairymen's Association in annual convention assembled to-day extend hearty greetings to the Western Ontario Dairymen's Association at their annual convention, St. Thomas. (Signed) W. A. McKay, Secretary." (Applause.)

I will now ask the Secretary to read the report of the Committee on Dairy Herd Competition.

Mr. Frank Herns: I will first read the Report, and then a letter from the winner in the Dairy Herd Competition.

## REPORT DAIRY HERD COMPETITION, 1914.

Owing to lack of funds the officers of the Association were unable to donate the usual cash prizes for this Competition. For the same reason the two sections arranged for in previous years for each class had to be dispensed with and only one class each for cheese factory and creamery patrons could be arranged for. There are 7 entries in Class 1, no entries in Class 2. The Canadian Salt Co., of Windsor, through their general manager, Mr. E. G. Henderson, very kindly donated two silver cups, one for Class 1 (cheese factory) and one for Class 2 (creamery patrons).

The silver cup for Class 1, which is to become the property of the patron who wins it twice in succession or three different times, was won by John VanSlyke, Dunboyne. He also won the cup for 1914 and therefore it becomes his property.

The second prize of a silver medal donated by Ryrie Bros., Toronto, was won by J. C. Harkes, Listowel.

**Two Diamond Hall Medals (enclosed in handsome cases), donated by Ryrie Bros., Toronto.**

**Two Silver Cups, donated by the Canadian Salt Company of Windsor, Ont.**

### Class 1.—For Patrons of Cheese Factories.

**To the patrons who furnish the largest amounts of milk per cow to any cheese factory in Western Ontario from May 1st to October 31st, 1914, from herds of 8 cows or over. 1st prize a Silver Cup, to become the property of the patron who wins the same three times or twice in succession; won 1913 by John VanSlyke, Dunboyne, Ont. 2nd prize a Silver Medal, value $10.**

### Class 2.—For Patrons of Creameries.

**To the patrons who furnish the largest amounts of butter fat per cow to any creamery in Western Ontario from May 1st to October 31st, 1914, from herds of 6 cows or over. 1st prize a Silver Cup, to become the property of the patron who wins the same three times or twice in succession. 2nd prize a Bronze Medal, value $10.00.**

### Rules of Dairy Herd Competition.

1st. No herd of fewer than eight cows in Class 1 and no fewer than 6 cows in Class 2 will be allowed to compete.

2nd. Figures must be taken from the cheese factory or creamery books, and the number of cows and the total average amounts of milk or butter fat must be certified to by the cheese or buttermaker, and the secretary of the cheese factory or creamery.

3rd. The average amount of milk or butter fat per cow must be calculated on the basis of the total number of cows from which milk or cream is sent to the factory during the season of six months, May 1st to October 31st, 1914.

4th. No substitution of one cow for another will be allowed.

## THE WINNERS.

### Class 1. Cheese Factory Patrons.

1. Jno. VanSlyke, Dunboyne; Dunboyne Cheese Factory; 100 acres in farm; 11 Holstein grade cows; 87,158 total lbs. milk; 7,923 lbs. of milk per cow.

2. J. C. Harkes, Listowel; Molesworth Cheese Factory; 100 acres in farm; 8 Holstein cows (2 P.B., 6 grade); 59,059 total lbs. milk; 7,382 lbs. of milk per cow.

3. D. Campbell, Komoka; Gold Creek Cheese Factory; 100 acre in farm; 13 pure bred Holstein cows; 89,272 total lbs. of milk; 6,867 lbs. of milk per cow.

4. Frank Strobridge, Ingersoll; Banner Cheese Factory; 50 acres in farm; 10 Holstein cows; 67,375 lbs. total milk; 6,737 lbs. of milk per cow.

5. Wm. Arthur, Sparta; Sparta Cheese Factory; 100 acres in farm; 10 Holstein and Durham cows; 61,751 lbs. total milk; 6,175 lbs. of milk per cow.

6. H. W. Duncan, Atwood; Silver Corners Cheese Factory; 100 acres in farm; 10 grade Holstein cows; 58,095 total lbs. of milk; 5,809 lbs. of milk per cow.

7. Willis Johnston, Listowel; Elma & Mornington Cheese Factory; 148 acres in farm; 12 Holstein grade cows; 67,235 total lbs. of milk; 5,603 lbs. of milk per cow.

## Letter From the Winner.

Dunboyne, Ont., Dec. 30, 1914.

Mr. Frank Herns, London, Ontario.

Dear Sir,—Your letter of the 28th carried very good news, all the better perhaps, because unexpected. The latter part of last summer was little more than a drought in this locality, and I would not have been surprised if this circumstance, coupled with other things that tended to decrease the aggregate of milk delivered to the factory, had diverted the ownership of the cup to another competitor. I am highly gratified to receive this splendid trophy.

With regard to your request for an outline of the building up and management of the herd, I will try to give a short, general account. Twelve years ago my herd consisted of grade Durhams, fairly good milkers selected from good milking strains. I determined to try the much-talked-of Holsteins, and accordingly purchased a pure-bred Holstein bull, intending him to be the sire of a new herd. The heifer calves were raised well and given good care. I always try to have heifers freshen when two years old, and take care to treat them kindly and to milk them throughout the entire twelve months of their first year of milk production. If any fail to come up to the standard they are weeded out and replaced by others of promising appearance. I make it a rule to raise all additions to the herd, and am thus in a position to judge to some extent of their ability. If, however, an especially promising calf fails to make good on a fair trial, she is weeded out also. Any member of the herd has to retain her position by the milk producing qualities, as my object is milk production. The "dual purpose cow" is generally not the one which excels in milk production. The tendency to put on flesh, however, is not pronounced where a pure bred Holstein sire is constantly kept, and all additions are the offspring of my own cows. This custom followed up through eleven years has evolved the present herd.

My system of managing the herd can be told in two words; the first is to get the cattle in good shape, the second is to keep them thus. It is my belief that an animal in good heart is far ahead of one in poor condition, other things being equal. It is especially desired that the cows be in good condition at the time of freshening, thereby insuring a more plentiful flow during the succeeding months of production than would be possible if conditions were otherwise. This is brought about by a rest of about two months, in which no milk production, whatever, is desired. Plenty of spring water is available at any time of the summer, good clean well water is provided in winter, and salt is accessible all the year round. The cattle are allowed to run out in winter for the greater part of every bright day, and I think that this goes a long way toward building up a vigorous constitution, an essential quality where superior results are desired.

The cows freshen in March and April, this time agreeing with the facilities at hand to take care of the milk. During the season they are milked at as nearly the same time night and morning as possible, thus allowing an interval of twelve hours between each milking. If even the haying or harvesting operations would tend to interfere with this routine they are suspended until after the milking; dairying is the principal industry on my farm. When the year goes out, the cows

are dried up and if the season has caused an expenditure of flesh an ample allowance is made in the individual feeding.

Early in the spring after the grass has started a little, the cattle are allowed to run at will over the uncultivated acres at the back of the farm. At this time each cow is getting about 15 lbs. mangels per day, while all through the milking season each one gets about 3 lbs. oat chop per day. When the pasture fields have grown up with six or eight inches of good pasture, the cows are turned into them. In this way a sudden change from dry to green fodder is avoided, and any harmful effects are still further lessened by an increasing supply of mangels before grass comes and a quantity after. The pasture provided is always clover and plenty of it and the fields being pastured one by one an interval is secured in which the remaining fields may recover. At the first of June a small field of six or seven acres is sown thickly with oats for a soiling crop and this is ready when abundant pasture begins to disappear. This provides a change and also helps out the regular pasture until the hay fields can grow up and augment the supply now suffering from a probable dry spell. From about the first week of August or a little later, green sweet corn, sown for the purpose, is fed twice a day until frost threatens, when it is cut and fed from the shock until exhausted. Then the stalks of the field corn, husked by hand, and well cured clover hay play their part in providing food for the remaining months.

The past year's herd consisted of eleven cows, to whom full justice is scarcely done when the returns show but 87,000 lbs. of milk, whereas the daily record statistics, compiled with the aid of the regular spring balance scales and record sheets furnished by your Department, show a total of 89,500 lbs. The discrepancy is accounted for by the liberal supply of new milk fed to a number of calves throughout the first month of the contest, and by the large amount required to maintain a farm house establishment during the summer months. It would seem reasonable to believe that a system which provides a first class animal, feeds it and cares for it in a proper manner, should yield first class returns.

Again let me express my appreciation for the cup put up as a prize for this particular line of work.

Wishing you a successful and happy New Year, I am,

Yours very truly,

JOHN W. VANSLYKE.

MR. LUG: What amount of grain was added to the regular ration during the summer?

MR. VANSLYKE: About three pounds of chopped oats with mangels.

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## PROGRESS IN COW TESTING.

CHAS. F. WHITLEY, DAIRY DIVISION.

If we may assume that cow testing is of some value to dairymen, we may hope to find some evidences of progress. A hasty sketch of two or three results may therefore be of interest.

One evidence of recent progress in cow testing is the marked increase of interest taken in it by the average dairy farmer, interest real and widespread.

Requests for information on the subject and for record forms come by almost every mail from all provinces. One demand for a further supply contains this typical statement, "I would not like to stop weighing, it is a surprising check on the feeding and working condition of the individual cow." That man weighs every milking.

A second evidence is the decided influence cow testing has had on general public sentiment. Occasional discussions on it are overheard amongst non-dairymen in public places, frequently with this commentary "what a simple and sensible proposition." It is not regarded as a freakish experiment, indeed, cow testing has proved itself a vital necessity to the progress of the true dairyman. Invisibly banded and corded together as such good men are now, the time seems almost ripe for a membership badge or a club button as a distinguishing mark of honour for these leaders, real benefactors of their communities.

Then the solid and substantial improvements made on dairy farms belonging to this progress club of cow testers constitute even to the most casual observer a third strong evidence.

Where do you note the abundant forage crop, the improved stables, the windmills, the new silo, etc., etc.? On the very farms whose owners use milk records. Local tradesmen and machinery agents have that fact sized up, and to those particular farms stream through the local dealers the labor-saving implements, the good piano, the new dresses, the inside plumbing and lighting systems for the deserving partners in the home. Cow testing helps along "Business as usual;" it rests not there, but always in the van of progress issues a summons to every devotee for "better business than ever."

Turning now to the personal equation, we find in the large crop of benefit reaped by the farmer himself a fourth evidence in such improvement made in the ordinary dairy herd that registers on the luminous dial of progress not merely present gain, but a forecast of future greatness. We find, for example, that the standard of production is being steadily advanced, men now talk freely of 7,000 and 8,000 pounds of milk as a herd average, and that type of owner aims even higher, while the type formerly content with 4,000 pounds per cow has mounted a few solid rungs up the ladder of progress. We find also amongst our cow testing members dairy herds with less indiscriminate mixing of grades of three or more breeds, herds where the proportion of low testing cows is decreasing, and herds that are of far more even production (where the lowest yield any one month is 730 pounds of milk and 23 pounds of fat) because dairy records have helped in selection.

So the educational features of this movement are of decided importance. For the knowledge obtained and the study induced by keeping records weigh down heavily the scales of self-development of the farmer and his family, while the opportunities now being embraced of introducing this subject through schools and short courses must be laden with large and valuable freight for the dairymen of to-morrow.

It means to any herd owner far greater efficiency than he now has, because while one score that counts is "more milk" the bull's eye aim is "more economical production by each cow in the herd." The successful shot on this target is dependent not only on a strong faith in the permanence of the dairy business, but also on having a thoroughly reliable and up-to-date equipment of cows busy behind each manger. In that aim cow testing has abundantly proved itself, wherever intelligently used, an indispensable range finder.

While we entertain unbounded admiration for the good dairy cow as an

economical producer of delicious food for mankind from the coarsest of feed, yet we can only stand aghast at the large room there is for general improvement. Taking a survey of 650 herds in our five eastern provinces, I contrasted the best cow in each herd with a poor one, the lowest yield but one, and obtained this result; valuing fat at 30c. per pound and allowing $35.00 as the average cost of feed, each one of the best cows gave as much profit above that feed cost as was made by fifteen cows of the poorest type. This comparison of 1,300 representative cows surely points out one great want, a better supervision and direction of willing, but at present quite erratic, cow energy is urgently needed on many a farm to-day; with 15 to 1 the odds are altogether too unequal. In this great cow game, duly indexed on fateful cards, what hand do you hold? Have you four dairy queens, a royal flush, or some mean little two spots?

It is the outstanding privilege, more, the bounden duty of every dairyman to move the pointer on his own pressure gauge of efficiency. Cow testing is good insurance against losses, and builds a solid concrete dam against the deceptive leaks caused by those poor cows that dribble only a meagre 125 or 130 pounds of fat in a season. We need to replace that too costly kind, that deciduous cow shedding her leaves too early in the fall, by the economical, almost evergreen type that in an honest season's work cheerfully gives 280 or 300 pounds of fat. To weight and sample is but a trifle, a matter of only half a minute; from that tiny seed act climbs the sturdy plant of knowledge up the trellis of your perseverance and intelligence, finding full fruition in cows that pay well.

Do you say it is too niggling a job? May I venture to remind you that lack of detail is the sombre headline in many historical chapters of failure. The master of details is a precise, punctual man, a sure winner. The small detail of weighing is well worth looking after. Your fellow dairymen bid me convey this message "it pays."

It is desired to lay emphasis on testing as well as weighing because it becomes daily of more importance. You may have noticed that since 1911 the value of Ontario butter has increased by one and a half millions of dollars, while the value of cheese made in Ontario has decreased by a similar sum. Then to every dairyman, but especially to a creamery patron, it is a matter of some moment whether a cow tests 3.4 or 4.3; whether she falls perhaps 10 or 18 pounds of fat in a month below the yield of a stablemate on the same feed. How would we know of these good grade cows, cows giving 50, 60 and 70 pounds of fat per month, if we did not have dairy records? The modern slogan "safety first" may well be heeded by the modern dairyman, to him it is translated perhaps better by "quality first," that is, such cow quality as, on the indisputable evidence of dairy records, produces abundant milk and fat at moderate cost.

[The speaker here directed the attention of his hearers to two large charts which were displayed on the platform, but which are not reproduced in this report.]

This chart (showing) gives as a diagram the comparative yield in boxes of butter of three types of cows. The first, selected, both fed and bred for production, is a five year old grade that gave 11,630 pounds of milk, 450 pounds of butter worth $135.00; with feed cost of $55.00, her clear profit is $80.00. Such cows and better ones have been discovered through cow testing. Her owner was not content with an ordinary type, an average cow, for satisfaction of that kind effectually kills and buries all progress, so he selected, using records as a rational basis. The second is the average yield of 8,200 cows as collected by our recorders at 13 dairy record centres in Ontario, Quebec and Prince Edward Island, namely,

206 pounds of butter worth $61.80, feed cost, $35.00, profit, $26.80. This is probably much better than the average yield of all cows in the Dominion. The third is the type unmasked by cow testing, desired by no one. In this case it is not just one lone individual cow, but is the average yield of a herd of ten cows in Ontario, 80 pounds of butter worth $24.00, and the owner estimated it cost $30.00 to feed each cow.

Does this comparison not convey something to you? Is it not worth a very great deal to you to look carefully into this matter of cow testing, to think in larger figures, to determine that your herd shall speedily be one of selected individuals? The best in everything is yet ahead of us; the best cow is yet to be recorded, helped on by the best in methods, the best in crops, the best in dairy farming generally so that our dairy herds, uniformly excellent, may be of the finest type possible, always improving. Join this society of unlimited possibilities, become a member to-day, start recording at once.

Cow testing has always sounded one dominant note, the selection, on their records, of the best cows. The recommendation is timely in view of the claim that there is an investment by dairymen of from $500 to $1,000, or more, for every gallon of milk produced per day. Thus the efficiency of every cow is no slight consideration in our huge business of milk manufacture. For every hundred dollars invested in the manufacturing industries of Canada there is reported to be a gross return of ninety-three dollars; in agriculture there appears to be a gross return of seventeen dollars. Can we do better? Dairy records, through giving what is absolutely essential to every manufacturer, a knowledge of cost of production, have paved for many men the royal road to larger returns; the successful business dairymen to-day make each cow they own stand her trial by the impartial jury of scales, test and record form. The sentence is soon passed, and several reformatory inmates now pay good dividends.

A fifth evidence is found in the largely enhanced profits and increased yields of milk and fat obtained by those well-informed men who persevere in acquiring knowledge charted in their own stables on the record form. The unit, whether cow or acre is being studied and developed as never before because of dairy records. Cow testing is not hedged about by any trade secrets or any copyright formula. No red tape binds one in making his own simple totals. There is no selfish or sinister competition; but on the contrary there is the greatness of true co-operation in securing results that count very materially in building a better home-farm, supporting loyally the nearby factory, advertising the locality as a good dairy section, while adding in no small measure to that needed efficiency which makes true prosperity for the empire.

This chart (shown) indicates graphically the yearly returns from a herd of 16 cows where some selection has been practised and all cows put on a paying basis.

With an average yield of 4,850 pounds of milk, 3.5 test and 170 pounds of fat, with feed valued at $35.00 per cow, there is a clear average profit of $16.00. But it will be seen that the five best cows yielding 204 pounds of fat make $26.00 profit as against the $4.00 average from the five poorest. Then on comparing the worth of the poorest cow, age 8, giving only 122 pounds of fat with the 12-year-old giving 247 pounds of fat, we see clearly that it is not a question of one cow returning just twice as much profit because she gives twice as much fat, but the profit is actually *twenty times* as great.

May I venture to submit that clearer proof could not be wanted of the practical utility of dairy records.

What additional sum is within our reach as direct gain from cow testing? Considerable light is shed by the fact that in one creamery in Prince Edward Island over thirty patrons, members of our cow testing association there, took in double the amount of money per cow last year than they did four years ago, while the other patrons show little or no increase. So it is in many other districts. There is nothing to prevent any factory of 500 cows, if its patrons take up cow testing in earnest, handling extra money annually to the extent of $8,000. We have men by the score in Ontario and Quebec now obtaining 1,000 and 1,500 pounds of milk more per cow than two years ago. Scattered all over, we find instances like this, the man who has been cow testing now milks eight cows and gets $400 or $430 more cash than the man who does not weigh and sample, but who contentedly or discontentedly (which?) fusses round with eleven unselected milkers.

This grand old Province of Ontario could be getting at least another twelve million dollars income from the cows now milking, and when cow testing is still better appreciated, she *will* obtain that sum.

Canada expects every cow to do her duty; "what we have" in the way of good cows "we'll hold;" what we have not, let us see that we get, and we'll get them because cow testing clearly points the true path of progress.

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## MILKING MACHINES.

E. S. Archibald, Dominion Animal Husbandman, Central Experimental Farm, Ottawa.

### Introduction.

The subject of milking machines is one which is very pertinent to all dairymen in Canada at the present time. More, each year the dairy farmer finds difficulty in obtaining and training the proper manual labor necessary to conduct such work, and each year the manual labor becomes more expensive.

The labor of the routine work with the dairy herd must go on at regular hours, early and late, every day of the month and every month of the year. This routine, which is considered so much of a grind by the hired help, is undoubtedly one of the greatest drawbacks to the dairy farmer, and one which is not felt by farmers who are dealing with other classes of live stock. Very often a dairy farmer finds himself with insufficient help, and it is then that he inquires most carefully into the feasibility of the mechanical milker. The incompetency of help is a subject all too well known by dairy farmers, and it is certainly difficult to obtain laborers who have all the requirements for dairy work, such as kindness to the cattle, lack of nervousness, regular habits, cleanliness, energy, capability and intelligence.

Modern machinery on the farm in almost every branch has largely increased the efficiency of work done and considerably cheapened the cost of labor, and it is to be expected that, if possible, the milking machine will assist the dairy farmer in exactly the same way as his other implements. This question of reducing the cost of labor by the use of the milking machine has been given the most stress in all milking machine trials during the last forty years, and it is our intention to lay particular stress on this all-important subject.

Clean milk is in greater demand throughout Canada each year, and if the labor problem continues to be as pressing it will be necessary for a large number

of farmers, who intend to go into dairying to meet this demand, either to limit their operations to the manual labor available, or utilize one of the better machines with sufficient equipment to thoroughly clean and sterilize the same.

This brings us to the subject of the requirements of a good milking machine. Briefly, these are as follows:

1. Simplicity.
2. Cheapness.
3. Durability.
4. Ease in cleaning.
5. Minimum of manual labor and minimum cost to operate.
6. Minimum power for operation.

Many of the machines on our market are certainly too complicated and costly for the average small farmer and the poorer farmer to purchase. Our experience would lead us to emphasize the fact that with any of these more complicated and more costly machines a more intelligent class of labor is necessary than in the old style dairying.

Strangely enough, milking machines have not made much headway in Canada until the last two years, although in England and Scotland milking machines are used very extensively in the large dairies, while in Australia and New Zealand milking machines are used commonly in both large and small dairies. I am scarcely prepared to say why the machines have not been used more commonly in Canada, and whether it is due to lack of advertising by manufacturers or indifferent satisfaction by the first users of the machines. However, during the past two years many machines of two or three different makes have been introduced into Canada, and for this reason the Experimental Farm System has decided to give this subject the benefit of careful experimentation.

## Evolution of Milking Machines.

In order to get a better knowledge of the requirements of the modern types of milking machines it is worth our while to briefly consider the history of the work done on milking machines in the past. After a careful study of the many makes and types of machines on our markets, I am safe in saying that America has done more for the perfecting of the modern type of machine than any of the European countries; nevertheless, Australia and New Zealand have outstripped America in this respect.

During the past forty years over 200 patents representing different makes of mechanical milkers have been taken out. This well illustrates the fact that manufacturers have been giving particular attention to this problem, due largely to the demands of the farmer. Modern work on milking machines started about the year 1878. The machines evolved during these forty years might be classified as being of three distinct principles, which are briefly as follows:—

1. The first principle was that of milk tubes being inserted into the teats. Five or more distinct types of tubes were manufactured and sold quite largely. All of these, however, have been discarded owing to the fact that a serious udder trouble frequently resulted which caused permanent injury to the udder and decreased the milk flow to a large extent. It is well to mention that there are still a few makes of mechanical milkers in the European countries which use the teat siphon as the basis for drawing milk. These, however, have met with no success, and are being replaced rapidly by the more modern principles.

2. The second principle is that of the imitation of hand milking, namely, the giving of pressure only on the base of the teat and this pressure following downwards. Over twenty-five different types of this machine were patented in Europe and the United States, but these too have met with very indifferent success. It is worthy of mention, however, that at the trial of milking machines conducted under the auspices of the Royal Agricultural Society of England in the year 1913, two Danish machines, namely, the "Manus" and the "Jens Nielsen," competed. The power of both these machines is a revolving shaft with a flexible shaft connected to sets of teat squeezers which are actuated by cams. The milk from the teat squeezers falls into open pails suspended under the udder. Not only were these machines unsuccessful as prize winners, but they were not recommended owing to the possible contamination of milk and the complication of the machinery.

3. The third principle is by far the most modern, this being a resemblance to the calf method of milking, namely, of suction and mechanical pressure. The first machine adopting the suction principle was the Murchland, patented in 1891 by Wm. Murchland, of Scotland. The machine was given a careful trial at the Ontario Agricultural College in the year 1895, and was discarded owing to its lack of ability to milk thoroughly and the resulting injuries to the cows' udders. This machine gave continual suction to the teats, no release being provided in order to give pulsation and relief from congestion to the teat. During the fifteen years following the introduction of the suction principle enormous numbers of different types have been patented and tried out with varying success. A marked advance in this type was made in the Thistle machine, patented in 1898 by Alex. Shields. This machine was given a careful trial at the Ontario Agricultural College, Guelph, in the year 1899, but this too was discarded owing to the fact that it did not milk thoroughly, induced some udder troubles, and was almost impossible to keep thoroughly clean in order to manufacture a clean milk. Following this, the Globe, another American milker, was tried at several of the Experiment Stations in the United States. The great fault with this machine was the fact that the rubber teat cups were not the shape of the teats. These cups had a collapsible upper edge, which gave a pronounced squeeze to the teat, and this together with the suction introduced the type of combination of suction, pulsation, and teat squeeze. This machine has long been discarded by the manufacturers and by all experiment stations using the same. It is interesting to note, however, that this type of teat cup, with the addition of an inner jacket, is now being used by the Hazelwood or "Calfway" milker.

The Lawrence-Kennedy Co., of Scotland, has manufactured many types during the past twelve years. However, all their earlier designs have been discarded for modern improvements. In the year 1905, Mr. D. H. Burrell, of Little Falls, N.Y., patented a design which, although discarded later, was the basis of the modern Burrell-Lawrence-Kennedy mechanical milker.

After a careful study of the different milkers now in use I would classify modern machines rather differently from any other classification which I have yet seen.

### Classification of Modern Milking Machines.

Modern machines might be classified as follows:—

(*a*) Those having intermittent suction, no squeeze to the teat, and no vacuum in can.

(*b*) Those having suction, pulsation, and squeeze to the teat.

(*c*) Those having suction, pulsation, and downward squeeze, with squeeze caused by the vacuum.

(*d*) Those having suction, pulsation, and no squeeze to the teat.

Before taking up the question of the individual types and makes of milkers found on our markets, it is well to settle the question of the advisability of a single unit milking one or two cows at a time. Various companies making each of these two types claim distinct advantage for each type. After carefully comparing two representative makes of each type on the Central Experimental Farm we have come to the conclusion that there is rarely much time lost by having two cows milk in the same pail at once. Special pails may be purchased from the companies with a division in the centre, thus allowing each cow's milk to be kept separate and records made of the same. After a farmer makes careful observations for a week, as to the time which is required to milk his various cows, he can, with very little reassortment in the rows, so pair the cows that there is practically no difference in the time required to milk each one. This small amount of time which might be wasted is, we believe, largely counterbalanced by the fact that the two-cow units cost just about the same and in some cases less than the single-cow units, which, even for a small herd means a considerably less capital expenditure for the two-cow unit milkers. However, this is still a more or less open question, and it is possible that after another two years' investigation we may change our opinion regarding this matter.

(*a*) This type of machine is one which has been patented in more recent years. The only outstanding example of this type in America is the Hinman milker, manufactured at Oneida, N.Y., and handled in Canada by H. F. Bailey, of Galt, Ont. This machine is a single cow milker, that is, each unit milks only one cow at a time. As far as single cow milkers go, this is an exceptionally cheap machine, costing less than half the sum that is charged by other single cow milkers on our markets, but in reality costing as much or more than the two-cow units such as the B.L.K., Calf-way, Empire, and other makes which will be mentioned later.

The outstanding features of this machine are: First, the individual pump. All other modern machines have a rather expensive piping system conducting the vacuum from the pump to the stalls of the cows. This machine, however, has a single drive rod on the headrail above stanchions and individual pumps which are readily adjusted to thisheadrail when the cow is ready for milking. For this reason there are no expensive vacuum gauges to get out of order. The vacuum is limited to the teat cups and the valve chamber in the cover of pail, thus eliminating the vacuum from the milk pail. On the other hand, however, the individual pumps are certainly very cheaply constructed, and I am doubtful if the leather on the plunger will be sufficiently durable to make this machine as permanent as one would like. This remains to be seen, although a number of farmers trying same have already made some complaints regarding this matter and the resulting lack of vacuum, which should be fifteen inches. The teat cups are extremely simple, and have no rubber linings or inflations. The milk flow on this machine is visible by lifting the can cover, there being no vacuum whatever in the can. The advantage of this system in cans is that there being no vacuum there will be no resulting inrush of air when vacuum is replaced in the can after milking. For this reason there should theoretically not be more contamination in the pail of the Hinman milker than other types, providing the can cover is not raised too often to ascertain how much the cow is milked. Another advantage claimed by the company is that of having no expensive pulsators to get out of order. This type of machine is being

sold quite largely on account of its simplicity and cheapness. Many users recommend it most highly.

(*b*) This class embraces the large majority of the twenty most modern and successful and mechanical milkers found on the world's markets at the present time. All these machines are dependent on intermittent suction, the intermittency being due to pulsators, and also upon the squeeze of the teat by a collapsible rubber teat or rubber lining to a metal-jacketed teat cup. There are many types of teat cups, pusators, and other parts, which give some makes a distinct preference over others. I will try to briefly outline a few of the outstanding makes and the outstanding features of each.

The Sharples Machine.—This machine is handled by the Sharples Separator Co., 1130 Dundas St., Toronto, Ont. A complete outfit of the Sharples Milking machine consists of the pump, compression and vacuum tanks, two lines of piping, and the milking unit. A milking unit is made up of the milk can, cover, four teat cups, the pulsator on pipe and all rubber connections. A complete unit which milks but one cow at a time, costs $110, with the pump, vacuum tanks, motor, and piping extra. The distinctive features claimed for this machine are particularly in the teat cups. The teat cup is composed of an outside metal jacket with an inside rubber lining or inflation. The compression coming at the base of the teat cup, causes the rubber to expand inwards, thus causing a more or less upward squeeze from the point of the teat towards the udder. This upward squeeze, so far as I can judge, is about as pronounced in several makes of teat cups, but is largely advertised by the Sharples company. One distinctive feature of the teat cup is that it is universal and will fit almost any size of teat. The milk flow is visible by means of a small glass on the side and near the top of the can against which the milk is thrown from the can cover. These glasses are exposed to breakage, and the method of discerning the milk flow is not as good as is found in some of the other makes. The pulsator is situated on the double line of piping above the cow's shoulder and is transferable from cow to cow. No milk comes in contact with the pulsator, from which the two lines of tubing are attached to the can and claws of teat cups.

The Lister Milker.—This machine, commonly known in New Zealand as the "Storrie milker," has only been recently introduced into Canada, but is one of the most prominent machines in New Zealand. This machine is handled by the R. A. Lister Co., 58 Stewart St., Toronto. This milker is of the double unit type, that is, milking two cows per unit at a time. Great simplicity and durability are claimed by the makers. A patent pulsator is attached to the can cover, which in fact is but a small vacuum pump which is exceedingly simple, and is used altogether for inflating and withdrawing the air from the chamber between the rubber inflation and the metal casing of the teat cup. Theoretically this pulsator simplifies the installation of the machine over the Sharples by eliminating one line of piping and the necessary compressor in the pump. Another outstanding feature claimed by this machine is that of the patent vacuum tap; this, however, being rather a minor point from a practical view point. The milk flow is visible at the bottom of the pulsator, where the milk empties into the can. The glasses in this case are inserted into the metal part and are so situated that they cannot be easily destroyed. This machine has, as yet, but a very limited distribution in Canada.

The Empire Mechanical Milker.—This machine has, as yet, been but little introduced into Canada, but is handled by the Empire Cream Separator Co., 95 King St. East, Toronto, and has a fairly large distribution in the United States.

An outfit of this machine consists of a pump, vacuum tank, single line of piping, and the milking unit composed of a can, two sets of teat cups, pulsator in can cover, and the necessary tubing. For a unit milking only one cow at a time the usual charge is $100, while the double unit is rated in Canada at $135. The distinctive features of this machine are the rubber lined teat cups with the squeeze as in above mentioned makes, this squeeze starting at the bottom of the teat and following upward toward the udder. The squeeze is actuated by the pulsator on can cover, which conveys to the base of the teat cups alternating vacuum and atmospheric pressure, as in the case of the Lister machine. The teat cups appear very simple and easily cleaned. The pulsator on can cover also is simple and easily cleaned, although the milk does not pass through the pulsator. The milk flow is visible through a piece of glass tubing inserted into the milk hose from teat cups to can. This machine milks two cows at a time if so desired and, I consider, is one of the promising milkers recently placed on our markets.

The Omega Milker.—This machine, too, is unknown in this country, and although working on the above mentioned principle is of a different type in many details. It is manufactured by the Omega Co., Flen, Sweden, and is handled in Canada by the Gilson Manufacturing Co., Guelph, Ont. In the milking machine trials in England during the year 1913 this machine was almost an outstanding winner. This milker milks but one cow per unit at a time. I beg to quote the report of the Royal Agricultural Society regarding the details of the machine:—

"The Omega machine consists of four main parts: the teat cups, the conduits, the pulsator, and the receptacle. These are combined in one unit which is attached to the cow by means of web straps, so that the weight of the unit is supported entirely by the cow; but unlike the majority of machines the milk ducts are made of celluloid, are transparent and very tough; the inner surface very nearly approaches the smoothness of glass, and so the milk ducts are quite easily cleaned. The teat cups are entirely supported on the celluloid duct tubes, which are led into the milk receptacle through the rubber ring washers; the latter are air tight, but allow of practically a universal motion of the cups, including a telescopic motion, thus allowing the cups room for adjustment to fit any cow. The tube being transparent, the attendant can at once see that all four quarters are milking properly, and by means of a tap, which is fitted to each tube where it leaves the cup, he can cease to operate any cup he may choose. The power required to work four machines is about 1 h.p., with a vacuum of 14 to 15 inches of water. The price of the four machines, sufficient to milk a herd of fifty cows, is £80 ($389.33). From two morning milkings of four cows the Omega machine averaged 19 lbs. 6 oz. of milk per cow, the strippings averaged 1 lb. 4 oz. per cow, and the time taken was 6¾ minutes per cow."

Class (*c*) has only one representative in America—"Calf-way"—and does not promise pre-eminence.

Class (*d*). This class, embracing the machines with suction, pulsation, and no squeeze to the teat, has only one very pronounced representative in America, namely, the Burrell-Lawrence-Kennedy milker, manufactured by Messrs. D. H. Burrell & Co., of Little Falls, N.Y., and handled by their agency of the same name at Brockville, Ont. Although I have no absolute statistics regarding the distribution of mechanical milkers in America, I am of the opinion that this milker outstrips all others in its distribution, more particularly in the United States, where the Sharples milker ranks as a close second in distribution. This milker is one of the oldest makes of the modern successful mechanical milkers, and each year is

adding improvements which are bringing it nearer perfection. This machine is strictly a two-cow milker per unit, and by its many users is valued largely on that account. Each pulsator thus milks two cows at a time and the one can accommodates the milk of these two cows. The divided can allows the weighing of each individual cow's milk. A complete outfit of the B.L.K. milker consists of a particularly good pump, one vacuum tank, a single line of piping, and the milking unit, consisting of can, two sets of teat cups, pulsator on can cover, and the necessary tubing. The teat cups are extremely simple, the same being slightly funnel-shaped metal cups with the enlarged lobe at the upper end, onto which is fitted the rubber discs, which are practically universal. However, this company makes extra sizes of teat cups which might be required for cows with abnormal teats. Generally speaking, the teat cup is of the universal type. Theoretically, this teat cup should be very much more easily kept clean and lighter on cows and more easily attached than any other teat cup on the market excepting the Hinman. It is worthy of note that the Burrell-Lawrence-Kennedy Co. have in the past tried a great many types of teat cups, including that of the rubber inflation, and have discarded all of the former types in preference to the above briefly described modern cup. One of the great objections to the machine which would be made by its opponents is that in relieving the vacuum on the teat an injection of barn air is taken into the milker at the end close to the base of the teat cups. However, special pockets to hold cotton filters are here provided, which apparently thoroughly filter the air, for it is a well known fact that many dairy concerns are manufacturing pure and even "certified" milk with this particular milker. It is worthy of mention that, with the exception of South Dakota, all of the various experiment stations, both in the United States and Canada, conducting experimental work along the lines of mechanical milkers previous to the year 1912, have dealt exclusively with the B.L.K. machine as representing the most advanced mechanical milker on the market.

Mr. Archibald has been conducting experiments with the Sharples milking machine since July, 1912, and with the B.L.K. machine since September, 1913. The data obtained is not sufficiently complete to warrant a final report, but the following facts have been established as a result of these experiments and the experience of a number of farmers using milking machines throughout Eastern Canada:—

(1) Either make of mechanical milker is feasible, and is successful when properly used.

(2) That the success of the machine depends entirely upon the intelligence and carefulness of the man operating the same.

(3) That some parts of the milking machine, although inexpensive, are short-lived.

(4) That the mechanical milker saves at least 50 per cent. of the labour of milking, but if correctly washed should increase by 25 per cent. the labour of washing and sterilizing dairy utensils.

(5) Great care is necessary in order to thoroughly wash and sterilize the milking machine, or it proves a source of contamination to the milk much worse than average hand milking.

(6) That it is necessary to keep all rubber parts in some mildly disinfecting solution in order to keep down the bacterial count.

(7) The mechanical milker does not, if properly used, decrease the production of the cows to a marked extent. In fact, it may increase the production where the quality of labor for hand milking is poor. Undoubtedly, for good results a

higher grade of labor is necessary when using the mechanical milker than when doing the milking by hand.

(8) Under average conditions the machine will undoubtedly not cause trouble with the teats and udders of the cows. Where trouble occurs a large portion is due primarily to lack of intelligence or carelessness in varying the machine to the individual cows' needs. Some machines are certainly preferable to others on account of their simplicity, not only in washing, but also in manipulation, in order to decrease the possibility of injury due to ignorance or carelessness. There are remaining a few isolated instances when the peculiar shape or size of the cow's teat may induce injury by certain types of mechanical workers.

### Summary of Results of Farmers Using Sharples Mechanical Milkers.

Mr. Archibald has been in close touch with a large number of men using the Sharples milking machine in Eastern Canada during the past two years. The following is a brief summary of the results reported by these men:

(1) The average man installs three units.

(2) He milks at the rate of about 3.3 minutes per cow per man.

(3) The average man is handling two single units.

(4) From reports from quite a number of users I find that approximately 25 per cent. claim that they have had trouble with the cows' udders and teats, but admit that such was due to either the pulsators sticking or a lack of intelligence on the part of the man in handling the pressure gauge which regulates the squeeze of the cow's teat; 75 per cent. no ill effects whatever.

(5) All report that the cows take very kindly to it from the start.

(6) About 50 per cent. report that the teat cups occasionally fall off or are kicked off, but this can be regulated either by the use of the strap or by the better means—more correct application of the squeeze to the teat.

(7) Apparently 50 per cent. of the owners are washing the machine carefully, that is, giving a thorough rinsing in hot and cold water, brushing and keeping all rubber parts in either lime, salt, or chloride of lime solution. Apparently 50 per cent. are not washing carefully in order to keep the machine sufficiently clean to produce pure milk.

(8) Sixty per cent. report more or less trouble with the pulsators. This, however, is largely due to carelessness in oiling, but may be partly due to the cold barn and the low temperature, which makes the oil heavy and sticky.

(9) Forty-five per cent. of the users have reported more or less difficulty with the rather complicated teat cup, this being due largely to lack of care in keeping the teat cup perfactly tight and the rubber good. All admit that when the teat cup becomes leaky it is undoubtedly a source of contamination in milking and often injurious to the cows' teats.

(10) As to the decrease in milk flow, 36 per cent. report that the cows decrease on the machine, but in each case it appears to trace either to the trouble with the pulsators or some similar trouble; 27 per cent. report no decrease; 27 per cent. do not know whether the cows have decreased or increased, and 9 per cent. claim that the cows have made an increase by the use of the machine.

(11) As to the cleanliness of the milk produced, none claim to be making a certified milk. However, 37 per cent. claim that the machine is cleanlier than hand-milking. 9 per cent. claim that it is dirtier than hand-milking unless especial care is used in washing the machine. 9 per cent. claim that the milk is dirtier owing to the fact that the machine is too complicated for the average man to wash and ster-

ilize thoroughly, 9 per cent. report that the milk is dirtier owing to udder trouble which they have had, and 27 per cent. claim that they do not know whether the milk is cleaner or dirtier.

(12) As to whether the machine is ultimately a success in their herds, 65 per cent. claim that it is an undoubted success, while of the 36 per cent. remaining, half prefer hand-milking, if they have sufficient help, and the other half have discarded the machine and gone back to hand-milking, in spite of labour shortage. However, 82 per cent. of those reporting claim that they are still using the machine.

### Summary of Results of Farmers Using Burrell-Lawrence-Kennedy Mechanical Milker.

(1) The average of 36 farmers using this machine show that each has installed between two and three machines—an average of 2.7 double units.

(2) From reports from farmers using these machines I find that they are taking 2.4 minutes per cow per man.

(3) I find that each man operating the machines is handling one and a half double units, or at the rate of three double units for each two men.

(4) Ninety-seven per cent. of the users claim that the machine is not injurious to the udders or teats of the cows in any respect, while 3 per cent. claim that it is injurious, but admit that such is due to carelessness in seeing that the discs of the teat cups are not sufficiently tight.

(5) One hundred per cent. claim that the cows take kindly to it, but 3 per cent. claim that from 10 to 20 per cent. of their cows hold up their milk to a certain extent, particularly when nearing the end of their lactation periods.

(6) Seventy-two per cent. claim that they have no trouble whatever with the teat cups falling off, while the remaining 28 per cent., who have had a little trouble, now either use a surcingle especially provided, or see that the discs fit sufficiently tight to the slim teats giving trouble.

(7) In the washing and sterilizing of these machines it is again found that nearly 50 per cent. are not giving the care necessary in order to keep the machine as clean as possible. Fully 60 per cent. take the machine apart only once a week for careful brushing and washing in hot soda solution. The remainder, however, apparently give the machine the necessary care, in thorough rinsing and washing, and the keeping of all rubber parts in either salt, lime or chloride of lime solution, in order to produce a clean milk.

(8) Sixty-six per cent. of the users claim that they have had absolutely no trouble with pulsators, while the remaining 34 per cent. claim that what little trouble they have had is due altogether to the lack of careful oiling of the pulsators each day. This pulsator has the advantage of the one in the machine previously mentioned, in that it does not remain in the barn, where the cold weather tends to solidify the oil in pulsator.

(9) Eighty-six per cent. of the users report that they have had no trouble whatever with the teat cups leaking; 14 per cent. admit that their trouble with leaky teat cups has been due altogether to carelessness in not seeing that the discs were renewed when necessary.

(10) As to the decrease in the milk flow, 5 per cent. claim that they have had an actual decrease in the use of the machine; 30 per cent. claim that their cows have increased since the machine has been adopted; 30 per cent. do not know whether there is an increase or decrease, while 35 per cent. claim that there is no difference in the quantity of milk produced either in hand or machine milking.

(11) As to the cleanliness of milk, 56 per cent. of users claim that the machine is cleaner than hand-milking, when the machine is well-cleaned and intelligently used; 11 per cent. claim that it is about as clean as average hand-milking; 8 per cent. state that the milk is clean, but that they do not notice what difference there may be, while the remaining 25 per cent. have no idea as to what the cleanliness of their milk is or has been.

(12) From 36 farmers using this machine, 34 unconditionally claim that the machine is a success; one does not know, and only one man claims that the machine is not a success, due to the fact that he has had some trouble with leaky teat cups, and that there was trouble resulting therefrom. Of the 34 who claim that the machine is a success, ten qualify by stating that it is if intelligently used; one qualifies by stating that the machine is successful on cows until nearing the end of the lactation period, and one qualifies by stating that the machine is satisfactory commercially for herds of 25 cows or over. However, of the 36 farmers with whom I have been in touch, all are using the machine at the present time.

Mr. Ault: Does a milking machine know when the cows are milked?

Mr. Archibald: No, that is just the point, and it requires a man of higher intelligence than the average to use a milking machine successfully. It depends altogether upon the man as to the ultimate success of the machine.

Mr. Johnson: What time does it take to milk a cow with the milking machine?

Mr. Archibald: That depends on how you operate the machine, but you can figure that it will cut the cost of labor in two. In an experiment with one of the machines, at the Central Experimental Farm, we found that our whole operation of milking, including the washing and wiping off of the cow's udder and flanks, carrying the milk to the milking room, and taking samples for the butter fat test and stripping after the machine—we hand-strip all the cows—looking after the milk and getting it over to the dairy, by hand milking took 11.1 minutes per cow, and with the machine it took 6.4 minutes per cow. With hand milking, there were five men working, and in the other case only three men and a boy. The operations at our barn are much more carefully done than is the practice of the average farmer, but we plan to produce and we do produce bacteriologically pure milk, which most of the time qualifies as certified milk.

Mr. Johnson: That means about two to one in favor of the machine?

A.—Practically. Personally I prefer the two-cow unit machine, for the reason that it costs about half as much and you have just half the capital invested. If you buy a single-unit milker, you pay from $100 to $120 for the outfit, and you have to put in one or probably two lines of pipe with all the other necesssary apparatus. With the double-cow milker you have the initial cost per unit of approximately $110 or $115, and you have only one line of pipe and a much simpler pump.

Mr. Smith: Have you tried the $50 unit?

Mr. Archibald: That is one of the machines we have not tried.

Mr. Goff: Would it not be better to have a one-unit milker, because you might have a cow on one side of the machine that was a big milker and the cow on the other side might only be a stripper?

Mr. Archibald: If one man was using the machine and stripping, then he would have to wait for the heavy milker, but with a little assortment of the cows in the barn that could be overcome. If you are operating a two-unit outfit alone and have a boy to carry the milk for you, then, as soon as the cow was milked on

the one side, you could turn her unit off and sit down and strip her while the machine was finishing milking the other cow.

MR. GOFF: You could not adjust that to another cow?

MR. ARCHIBALD: Yes, you could shut off both or either of them as you like, so that you would not be wasting time. If you are operating the machine and doing the stripping, then there would be possibly some waste of time, if you had a large number of units one man should do nothing but attend the units.

MR. GOFF: Yes, and you would have trouble in changing the cows about in the barn?

MR. ARCHIBALD: Yes, that might be. It would just depend on how much assorting you would have to do, but I will guarantee that in the average herd, where most are full milkers, the re-arrangement of the cows would not be very difficult.

Q.—How low would you keep your bacteriological count if you washed once a day?

A.—You should be able to keep it below 20,000.

Q.—I am able to keep our count down below 10,000 by hand-milking?

A.—Yes, I thing you would be, and if you have 10,000 at the dairy, there would be many more thousands by the time the milk would be put into the hands of the consumer. I figure that 200,000 per c.c. in the milk when it is put in the hands of the consumer is good, wholesome milk, provided the bulk of the bacteria is lactic acid bacteria. Pathologically, we had a little trouble with the cows, but we could not trace it directly to the machine. Sometimes it was the fault of the man operating the machine in giving too much squeeze.

MR. BROWN: What effect do you find on the milk where you feed silage?

A.—We got very good milk.

Q.—Cannot you feed too much?

A.—We have not fed too much yet. We feed about 32 pounds to our cows. Cows milking 60 pounds or over are getting about 42 pounds of silage, about 12 pounds of turnips, and about five pounds of cut straw, all mixed together. Up to the present time we have had no flavor of turnips or silage in the milk and the quality of our butter is good. We always feed after milking, and we feed the grain on top of that ration. We fix it during the day for the next feed.

Q.—How much grain do you feed?

A.—At the rate of about one pound to four pounds of milk produced; that is during the winter time.

Q.—Do you feed anything else besides that?

A.—We feed hay twice a day.

Q.—Do you feed any oil cake?

A.—It is included in our meal mixture. The meal mixture we are using is four parts of bran, three parts of ground oats, two parts of oil cake, and two parts of cotton seed, and we feed that mixture at the rate of one pound for every four pounds of milk produced. At the end of the milking period they only get one pound for every five pounds of milk produced.

Q.—What is that grain mixture worth per 100 pounds?

A.—It has been costing us from 1¼c. to 1¾c. per pound. Our cotton seed costs us $32 and oil cake $31; bran $21.50. The oats grew on our own farm.

Q.—Do you allow interest on your capital?

A.—No, I have not figured that in at the end of the year.

Q.—You cannot keep a cow for $35 a year?

A.—I cannot keep a good cow for $35 a year. You cannot carry on dairying for $35 a cow the year round. You may carry on summer dairying, and by putting a low valuation on your hay and straw and ensilage, do so.

Q.—Do you bring your feed right down to the floor of the barn in this shoot and then have a door at the side to take it out of?

A.—Yes.

Q.—I believe there is considerable ill effect produced in the milk from the dust in the barn?

A.—Yes, there is no doubt about that. I would just like to pass a word of warning to the dairymen of Western Ontario if they are going to use milking machines; they must be prepared to wash these machines carefully.

Q.—How did you get rid of that contagious garget?

A.—We simply got rid of it by isolating the cows altogether. We took them away from the rest of the herd and had a man milk them who was not milking any of the others, or who would go to them after milking the others.

Q.—Did you treat them?

A.—No, we did not give them any internal treatment. We kept the udders as healthy as we could. As soon as inflammation came on, we used vaseline or something of that kind and good hand massage. We did everything we could to stimulate the circulation, and tried to make the system throw it off. Two or three of our veterinaries worked on it, but they could not isolate the organism and they did not suggest any different treatment. If the affected cows are milked after the others, there is no danger of contamination, but with the milking machine it is transmitted from one cow to the other.

Q.—What is the nature of the disease?

A.—A quarter might swell or show a slight thickening at night; it might have been all right in the morning. Sometimes the quarter will swell to twice its nomal size and the animal might give practically no milk, but in three days by careful treatment it can be brought back to normal. In several cows the quarters were permanently injured.

Q.—Did you bathe them with hot water?

A.—We depended more on hand rubbing with vaseline or ointment, and we used hot lotions.

Q.—Did you try giving them active motion by running them up and down the lane?

A.—That might help in some cases, but not very often.

Q.—I have heard it said that it goes through the whole system?

A.—Yes, I think that is the case.

Q.—Were these cows lying on cement floors?

A.—We have had it where they were lying on wooden floors. In our new barn, which I have had the pleasure of building, I am trying four different types of floors—the Dutch floor, the cork brick, cement and wood. I will probably try some of these Scotch straw mats. I have a good Scotchman who can twist up a mat, and I am going to have them under the front feet. I am also trying four different types of stalls and four different systems of watering. Cork brick is very good, but it is too expensive. I think if you insulate cement floors you can make them all right. If you have plenty of rock on the farm and put eight or ten inches of stone down before you put your rough coating of cement, there will be no direct contact between the clay and the rough coating of cement, and you will keep the moisture from filtering up. (Applause.)

THE CHAIRMAN: I have now much pleasure in asking Mr. J. W. Mitchell, of Manitoba, to take up the discussion of the questions that we have had presented to us so ably this morning.

## DISCUSSION ON DAIRYING.

(Led by Prof. J. W. Mitchell, Winnipeg, Superintendent of Dairying for Manitoba, Winnipeg.)

We should always keep in mind the nature of our dairy business. It is a manufacturing business from beginning to end. We are always taking something coarse and turning it into something finer. We must consider where our profits come in, and I think we all agree when we say that the profits will consist in whatever difference we can make between the cost of production and what we receive for our products. We do not control the market except in so far as we can turn out the products that will bring us the highest price. The question of supply and demand controls the market, and it is up to us to control it in the way of producing a first class article. One point over which we have had control is the cost of production, and that is a question that you have been dealing with to-day. In Manitoba we have had to take up cow-testing work more or less ourselves, because we are quite a distance from Ottawa, and from our experience I would say that I do not think, with all the enthusiasm Mr. Whitley has in regard to the work, that he can have too much, because it is a very important side of our dairy operations and helps us to study out the problem of how to produce our milk more economically. In carrying on this work, some things require to be carefully looked into, and you must make a standard for yourself in connection with the work. We should say that we will have every cow in the herd producing not less than 6,000 pounds of milk. That is not very high, and a great many dairymen would not be satisfied with that at all.

There is another point that I wish to mention and that is, that unless cow testing is carried out throughout the cow's milking period, it is not particularly valuable. In Manitoba we insist that they must make us a promise that they will carry on the work throughout the cow's milking period because we find that testing for three or four months is most misleading. There is no greater mistake that you can make than the averaging up of a dairy herd. We must make each tub stand on its own bottom and we must take care of the individual cows. Cow testing enables us to find out what each cow is doing in the way of producing milk and the butter fat in the milk. It enables us at the same time to find out the best cows for breeding purposes, and that is a big advantage. It also helps us to feed more intelligently. You will find in connection with different cows in the same herd that if you feed them one quantity to-day and then increase the feed to-morrow that some cows will respond to the increase in feed by giving you more milk, but you will find other cows that will not respond sufficiently to pay for the extra feed, because they have practically reached their limit, and by taking care in this regard you will be able to feed more intelligently and to know what each cow is doing and how much food she can consume and give a profitable return.

Mr. Lug: How long do you consider a cow should milk?

Prof. Mitchell: We find that varies a great deal. Some cows will dry up at the end of six or seven months. I think a cow should milk 10 months in the year, and if she has been properly trained from the start she will do that.

Now, with regard to the necessity of weighing each cow's milk, let me give you a couple of instances to emphasize that point. Here are two cows in the same herd under the same conditions as to care and feeding. They are both mature cows. During the first month, cow No. 1 gave 746 pounds of milk and cow No. 2, 842. During the second month, the first cow gave 831 pounds and the second

cow, 1,174. You would think that that second cow would prove a much better animal than the first one, but when we came to the end of the milking period, what do we find? That the first cow produced 6,811 pounds of milk; she milked for 10 months; and the second cow produced only 5,314, because she went dry in seven months.

You will find that two cows in the same herd that are giving practically the same quantity of milk, may start out with the same percentage of fat, and yet at the end of the milking period it may not be the same. To give you an instance, here are two cows in the same herd; they start out with 3.4 per cent. and 3.3 per cent. of fat in the milk for the first month and in the ninth month, when they were giving almost the same quantity of milk, the first cow's milk tested 4.1 and the second cow's milk tested 5.3, and we have found the same results in many instances.

Q.—How often do you take samples?

A.—We have been following the practice of weighing the milk and taking the samples three days in the month, ten days apart.

Mr. Whitley: That comes out very close with the daily weighing.

Prof. Mitchell: There is one thing I would like to mention with regard to weighing milk. I think we could make more improvement in the way of weighing ten days apart. We have been taking the 10th, 20th and 30th of the month; that is the end of each ten day period. I think it would be better if we would weigh on the 5th for the average of the first ten days, on the 15th for the average of the second and on the 25th for the average of the third ten days. I think that would give us better results than by weighing at the end of each ten day period and we adopted that plan this year.

Q.—What is your opinion of a thirty day test and then taking seven days of that test as the standard for the season's work?

A.—It may be better than no test at all, but you will only get misleading results by taking a test of that kind because you will find cows do not increase in the milk or decrease at the same rate.

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## ADDRESS.

J. F. Singleton, Dairy Branch, Ottawa.

In framing the Dairy Industry Act, there was no thought or intent of imposing any unreasonable practice or restraint on any persons in the business. The object of the legislation was simply to protect the interests of the honest manufacturer of dairy products, the honest trader and the consumer.

Section 3 of the Act defines several terms used in the Act, one of which is butter:

"'Butter' means the food product commonly known as butter, which is manufactured exclusively from milk or cream or both, with or without the addition of colouring matter, common salt, or other harmless preservatives."

Section 3 also defines the word "Creamery":

"'Creamery' means a place where the milk or cream of not less than fifty cows is manufactured into butter."

and the word "Dairy":

"'Dairy' means a place where the milk or cream of less than fifty cows is manufactured into butter."

Consequently any farmer who is milking fifty cows may use the term "creamery" on his butter. If he has not fifty cows, he cannot use the word "creamery."

Whey butter is defined as butter which is manufactured from whey. I understand there is no whey butter made in Western Ontario, but in Eastern Ontario there is considerable of it manufactured.

The next clause of importance deals with the inspection of milk, and there are one or two slight changes in this Act from the old one. The present Act has been enlarged to take in milk powder factories, casein factories and cream shipping stations, and the minimum penalty for violations of this section is increased from $5.00 to $10.00.

The next section of importance has to do with the manufacture of oleomargarine or butterine or other substitutes for butter which have always been illegal in this country.

Another section deals with the mixing of water with butter: "No person shall mix with or incorporate with butter, by any process of heating, soaking, rechurning, reworking, or otherwise, any cream, milk, skimmilk, buttermilk or water to cause such butter when so treated to contain over sixteen per centum of water." If a creamery man sells butter of his own make containing more than 16 per cent. of water, he is liable to a fine of from $10 to $50, and if a store-keeper retails the butter he is liable to the same penalty. If a man takes butter which is already finished and mixes it with water and gets in more than 16 per cent. of moisture, the penalty is from $200 to $400. These men who mix water with the butter may sell it to five different stores and the courts have allowed us to enter separate charges for each place where we have found the butter. Several boxes of butter might be treated in this way at one time and may be sold to several different stores and we can lay information against each store; also a charge may be laid against the man who mixed the butter for each store to which it might be sold.

Another section says:

"No person shall import into Canada, or offer, sell or have in his possession for sale: (*a*) any butter containing over sixteen per centum of water; or (*b*) any process or renovated butter, or butter to which milk or cream has been added."

It does not necessarily follow that because we happen to find one churning over 16 per cent. that the maker will be prosecuted. Our policy to a certain extent has been to consider how we would like to be treated if we were in the other man's place. If one of our inspectors goes into a town and secures a sample of butter from a certain creamery that has above 16 per cent. of water, he will endeavor to get four or five other samples from the same creamery. If they are all above 16 per cent. and it looks as if it was a habit with that creamery, the owner or manager would be prosecuted. If we find only one sample to contain above 16 per cent., the owner or manager would be given a warning and the matter would end there. There is always a possibility that something will go wrong in the creamery, a valve leak or the cream gets too warm, producing a butter containing more than 16 per cent. of water, but with no intent to defraud on the part of the creamery men. In a case of that kind, he would not be prosecuted. The next section is entirely new and deals with the weight of blocks or prints:

"No person shall sell, offer or have in his possession for sale: (*a*) any butter moulded or cut into prints, blocks, squares or pats, unless such prints, blocks, squares or pats are of the full net weight of one-quarter pound, one-half pound, one pound or two pounds at the time they are moulded or cut. Nothing in this paragraph shall be held to apply to butter in rolls or lumps, of indiscriminate weight, as sold by farmers."

In most Ontario cities the question of the weights of print butter is fairly well looked after by the municipal authorities, but in other parts of the country, we find much print butter weighing 14½ ounces to 15 ounces per block. In fact, there was one creamery shipping butter into Montreal this year and invoicing it as 50 blocks or 100 blocks and these blocks were only weighing 15 ounces, and that ounce per pound would amount to more than enough to pay the salary and expenses of any inspector on this work.

The next section deals with the making of filled cheese and is practically the same as in the old Act. But the new Act contains another new feature giving the Governor-General in Council power to pass regulations governing several different phases of the dairy business. The benefit of that is that if any new condition arises in connection with the business, regulations can be readily passed dealing with it, whereas if it were necessary to secure an amendment to the Act, it would be necessary to wait until there was a session of Parliament.

The regulations deal with the branding of butter and cheese. The first clause covers the printing and gives the legal size of the lettering required for branding packages containing cheese and butter and for printing on parchment paper. In the old Act there were just two classes of butter mentioned or recognized, namely, creamery butter and dairy butter. In the new Act we have a third class, namely, whey butter. Under these regulations, whey butter must be branded as such and it is illegal to brand whey butter as dairy or creamery butter. Many men were making whey butter in the past and branding it as creamery, but as soon as these regulations came into force, whey butter had to be branded as whey butter. A package of whey butter must be branded with the words "Whey Butter" and dairy butter, if in prints, or the square 56 pound box, must be branded with the words "Dairy Butter." A man making butter on the farm is not allowed to brand his butter as creamery butter, but a man putting up creamery butter is allowed to brand it as dairy. Some men who are making dairy butter object to that regulation and if the dairymen of this country wish to make the creamery men stand on their own feet, they should ask for a regulation requiring all creamery butter to be branded as creamery butter; they could get that regulation for the asking.

A MEMBER: They should have it.

MR. SINGLETON: I have been looking into this question. If you go into Toronto or Montreal, you will find a number of good wholesalers that have a big trade in dairy butter, and when it comes to October and November, they cannot get dairy butter to fill their orders, and they get creamery butter and sell it as dairy butter and tide the trade over in that way. If they are not allowed to do that, they will sell dairy butter until they cannot get any more to supply the trade, and then they will have to supply their customers with creamery butter. By the time dairy butter is again on the market, the customers will have gotten accustomed to creamery butter and might not change back, and it might do the dairymen of the country a great deal of harm.

Another regulation is one which reads as follows:

"No person shall, knowingly sell, offer, expose or have in his possession for sale, any cheese which is branded or any cheese or butter which is contained in a package which is branded in such a manner as to give false information as to country of origin, or as to the cheese factory or creamery in which it was manufactured."

To illustrate, there is a grocer in Toronto who bought butter from a creamery up north of Toronto, and he worked up a pretty good trade for that brand. This grocer had duplicates of the creamery wrappers printed and sent them to

a Toronto firm who were doing a wholesale trade in butter and got them to put up butter in the wraps of this creamery. The creamery man had built up a trade for that particular brand of butter, and formerly there was no way of getting at such a man as this grocer, but this regulation prohibits that practice. That brings up the question of one creamery not being able to supply their own trade, and it has been customary in the past for one creamery to send the wrappers to another creamery and get them to put up butter in their wrappers. That is a violation of the Act under the new regulations, but any creamery man may feel free to do that as far as the Department is concerned. The object of the regulation is to protect the man who has built up a reputation for his product, and if the man who is responsible for the reputation of the brand wishes to buy other butter and take his chance on the quality, we have not any objection. In such cases, the creamery whose brand appears on the butter will be held responsible for the moisture content of the butter.

In all these cases of selling butter which is not legal, the retailer is equally liable with the man who made the butter. Our policy is as far as possible to get back to the man who made the butter and who is responsible for the fraud.

A MEMBER: Does that apply to the farmer?

MR. SINGLETON: Yes, just in the same way; but the farm butter of Canada will average up about 2 per cent. less moisture than creamery butter. I think I have mentioned the principal points of the Act. It is published as Bulletin No. 42, and I would be pleased to supply a copy to any one who wishes it, or if you will write to the Dairy Commissioner, at Ottawa, it will be forwarded to your address. We also have a circular covering the branding of dairy butter and we supply these to merchants in any quantity they desire, so they can pass them out to the farmers. At the present time, the farmer who sells butter in plain wrappers is liable, under the Act as well as the merchant who sells it, but we wish to give everybody a reasonable time to adjust themselves to the change and not work out any hardship.

## NOMINATING COMMITTEE.

Moved by S. E. FACEY, seconded by MR. BARBER, that the following constitute the Nominating Committee: John Brodie, E. M. Johnson, J. J. Parsons, W. Waddell, F. O. Flynn. Carried.

## ADDRESS OF WELCOME.

M. D. JOHNSON, Mayor of St. Thomas, expressed pleasure in welcoming so many ladies to the evening session. After referring to the possibilities of Elgin County with its diversified agriculture he extended the freedom of the city to those in attendance at the Convention, and expressed the hope that the Convention would come to St. Thomas again at an early date.

MR. HORTON, representing the St. Thomas Board of Trade, welcomed the delegates on behalf of that organization. "I am very glad to say to the members of this Association that under the stress of the present times and conditions, commercial interests are holding their own better than we expected. St. Thomas

to-day is the best city of its size in the Dominion of Canada, speaking from a financial standpoint and from a business standpoint. The railways play an important part in this connection; we have five lines of railway running through our city besides the inter-urban line. We have tried to make arrangements for this Convention which would be satisfactory to you, and I desire to extend to you, Mr. President, and to the Dairymen of Western Ontario in convention assembled, an invitation to meet with us next year. We would be glad to welcome you back again.

THE CHAIRMAN: Mr. Mayor and President of the Board of Trade: On behalf of the Western Ontario Dairymen's Association, we thank you sincerely for your kind words of welcome and the freedom of the city.

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## NOTES ON THE DAIRYING INDUSTRY OF SWITZERLAND.

J. A. RUDDICK, OFFICIAL DELEGATE FROM CANADA TO THE VIth INTERNATIONAL DAIRY CONGRESS.

As official delegate from Canada to the VIth International Dairy Congress, held at Berne, Switzerland, June 8th to 12th last, I had, along with other delegates an opportunity of seeing something of the unique dairying industry of that country, and of studying some of its most interesting features.

### THE SWISS NATIONAL EXHIBITION.

The sessions of the Congress were held on the grounds of the Swiss National Exhibition, an arrangement which enabled the delegates to give considerable attention to the finest display of the life, industries and activities of a people that the writer has ever seen. The exhibition is held once in 12 or 15 years and is open for six months. It is purely national in all respects. No foreign exhibits of any kind are shown. The exhibition deserves more than passing notice, but space will permit only of reference to a few salient features.

It was impressed on the visitor at every turn that the moving principle of the whole exhibition was education, rather than entertainment or advertising. There was an entire absence of what has become known at our exhibitions as the "Midway" with its silly and often degrading shows. One was struck also by the orderliness of the grounds and buildings. No litter or waste paper was to be seen anywhere, because the people were careful to place all such rubbish in the receptacles provided for that purpose.

It was interesting to see troops of rural school children visiting the exhibitions under the guidance of their teachers and having everything carefully explained to them. It was said that practically all the pupils in Switzerland of a certain grade were to be brought to the exhibition some time during the summer. I am not sure that I would care to see Canadian children so serious minded as these young Swiss appear to be, but there is abundant evidence in the country's progress and achievement, that the education which they receive makes for efficiency in after life. All told the Swiss National Exhibition was well worth seeing, and it was made none the less interesting by the fact of its being located on high ground overlooking the beautiful City of Berne, with the Bernese Oberland, presided over by the queenly Jungfrau, for a background.

### Proceedings of the Congress.

With respect to the congress itself, the proceedings were not marked by any very definite expression of opinion respecting the subjects set down for discussion. The question of the control of bovine tuberculosis was considered at some length. The veterinary section, led by Professor Ostertag, the well known German authority, did not succeed in having their plan for veterinary control endorsed. Definite action was postponed until the next Congress. The question of proposing a fat standard for the dry matter of all kinds of cheese was likewise laid over for future consideration.

It is generally admitted that the most useful function of these triennial gatherings, is the facilitation of intercourse among the delegates, and the opportunities which they afford for a world wide acquaintance among workers in the field of dairying. The excursions which followed the sessions at Berne were, to many of us, the most interesting and instructive feature of the Sixth Congress.

### The Excursions.

The Bacteriological Institute at Leibfeld, which was visited, is of international reputation, and some of the best research work in dairy bacteriology has been done there. The labours of Dr. v Freudenreich, Dr. Orla-Jensen and Dr. Burri are familiar to all dairy students.

The Agricultural College at Rutti, and especially the dairy department, was investigated with interest. The dairy course at Rutti covers the whole field of dairy farming, including the feeding, care and milking of the cows, the manufacture of cheese, the feeding and rearing of pigs, etc. The students do all the work, and thus permit the school to be conducted with a surprisingly small appropriation. The buildings and equipment are thoroughly practical and one is led to believe that students are not afforded much accommodation or comfort superior to that which is found on an ordinary farm. For this reason it is claimed that graduates go back to the farm without the discontent which sometimes follows such training received under other conditions.

The last excursion, which was made by steamboat, railway, motor car and afoot, covered a goodly part of central and northern Switzerland, and while the principal object was to inspect the Swiss dairy operations of both the tablelands and on the Alpine pastures, it gave the delegates an opportunity of seeing some of the finest Swiss scenery. A railway journey to the top of the Jungfrau, (12,000 feet) via Lauterbrunnen and Grindelwald, and another over the Rigi (6,000 feet) were the chief scenic attractions. A walk down from the summit of Rigi, over a celebrated Alpine cattle raising pasture, was much enjoyed by those who joined the party.

### Dairy Methods.

The manufacture of cheese and condensed milk are the two most important branches of the dairy industry in Switzerland. A form of co-operation in the manufacture of cheese has been in operation since the 12th century. Most Canadians are familiar with the large flat cheese full of round holes, which goes under the generic name of "Swiss," but which is divided by the initiated into two varieties known as Gruyere and Emmenthal. The export trade is confined chiefly to the Emmenthal, which is sent to every cheese eating country in

the world. We had a chance to see some well equipped city dairies, notably one at Zurich established by Dr. Gerber, said to be the best in Europe.

The methods followed by the Swiss cheese makers call for no special mention, but the production of milk, especially in the matter of the yield per acre, has been carried to a point far beyond that which has been generally reached in Canada. This has been accomplished through the persistent development of two excellent breeds of dairy cattle, by the most careful conservation of all manure both solid and liquid, and by studying the economics of feeding so as to utilize the grass crop to the best possible advantage. Cow testing has been systematically practiced by some Swiss dairymen for over 40 years. The number of dairy cattle kept per square mile of arable land for the whole country is just about 100, but in the less mountainous cantons like Berne, the number is as high as 265 per square mile.

On the central plateau a very large proportion of the arable land is laid down in permanent grass, but the cattle are seldom allowed to graze. The grass is cut as required and fed in the stable where the animals are confined. The stables are mostly old and fall far below the modern standards of lighting, ventilation and general sanitation, and yet the cows are exceedingly healthy to all outward appearances. The grass is often cut at a very immature stage, and nature, as if in resentment at such interference with her plans, seems to put forth renewed and more vigorous efforts in subsequent growth, so that the same ground is cut over several times. In the Alps grazing is the universal practice.

Where the cattle are stabled the utmost care is taken to preserve every ounce of manure. The liquid is drained into concrete tanks from which it is carried on wet days and sprinkled over patches of recently cut grass. Much more might be written on these points but lack of space prevents further reference at this time so we pass on to consider briefly the interesting breeds of cattle which constitute the bovine population of the country.

### Swiss Dairy Cattle.

First in point of antiquity is the Schwyz (Brown Swiss) which is said to have been bred for a longer time in one place than any other known breed. They have been traced back to the period of lake dwellers. The color is a dull grey or mouse color. Animals (very rare) showing any white are not admitted to the show ring. All have black muzzles with a light rim and the inner side of the legs are lighter than other parts of the body. The legs are short and strong as befit a hill climbing race. They fatten readily and the quality of the beef is said to be excellent. The weight varies according to the region, but the average of the cows of the heavy type is given as 1,320 to 1,430 pounds. A full grown bull will weigh on the average 1,800 to 2,000 pounds and in some cases as high as 2,400. The average annual yield of 72 Schwyz cows, of which records have been kept, was 8,373 pounds of milk testing 3.88 per cent. of fat, but these were probably superior animals.

The most important breed in point of numbers, comprising 55 per cent. of the total cattle is the Simmental. This breed is quite modern compared with the Schwyz, having been introduced by the Burgundians in the 5th century. The colour varies from yellow to dark red with white spots. They are heavier than the Schwyz, cows running as high as 1,600 pounds weight. The breed is remarkable for the rapidity of growth in young animals. Most of the work animals are taken from this breed, the cows frequently being pressed into service on small farms.

The average annual milk production of Simmental cows, according to numerous enquiries made by Dr. J. Kappeli in various Swiss farms, is 7,700 pounds per head, or 5¼ to 5½ times the live weight. Herds that are well fed in winter give an average of 8,800 pounds and individual cows have produced as much as 15,400 pounds in a year. The average fat test is 3.75 per cent.

A third breed, known as the Friburg, of relatively small importance as regards numbers, resembles the Simmental except that the color is black and white like the Dutch cattle.

The D'Herens is a small dark brown mountainous breed, few in number and confined to the Valaisan Alps.

All cattle in Switzerland are practically pure bred. Cross breeding is almost unknown and there are no animals in the country of any other breed except those herein described.

### Cattle Raising in the Alps.

An interesting development has taken place during recent years in many of the Alpine regions where the manufacture of cheese has been abandoned for the business of cattle raising to replenish the native herds on the plateau, and to supply the large demand for Swiss bred animals in Austria-Hungary, Germany, Italy and Russia. It is held that the vigor of the cattle is improved by the pure mountain air, and the exercise involved in climbing the steep slopes of the pastures. The real Alpine pastures begin at an altitude of about 2,500 feet, and extend upwards nearly to the limit of vegetation, or somewhat over 8,000 feet. Goats are pastured in some places as high as 9,000 feet above sea level. In the month of May the cattle are taken to the lower slopes and as the summer advances they are driven by successive stages to the higher altitudes and the grass on the first pastures is allowed to mature for hay. By the middle of September they have been brought down again to feed on the aftergrass of the meadows until stabled for the winter.

### Some Characteristics of Swiss Cattle.

The extreme docility of Swiss cattle is very noticeable. Animals at large in the pastures will allow a crowd of strangers to approach and handle them without the slightest sign of restlessness. They appear to like it. Even aged bulls are led in a common halter, often without a ring in the nose. It is the boast of the Swiss cattle owner that the placidity of his cows is so marked that there is no occasion to avoid a crowd of strangers in the stable at milking.

It was remarked that every animal, milking or dry, was in beef condition. Although our visit was made in the month of June, cows in poor condition were conspicuous by their absence. Perhaps it would be more accurate to attribute this condition to generous feeding rather than to mention it as a special characteristic of the breeds.

It would be quite possible to amplify the points thus briefly touched but further reference to an interesting subject must be reserved for another occasion.

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## ADDRESS.

Hon. Finley G. Macdiarmid, Minister of Public Works for Ontario, Toronto.

When one thinks for a few moments only of the ramifications of the dairying interests, the importance of its influence upon conditions financially, commercially and even socially, they loom much larger than generally appears on the surface. One is apt, superficially, to associate the dairying interests with the production of cheese and butter. I can assure you, its influence goes much deeper and its field is much wider than either. True, cheese and butter are perhaps vital to any serious consideration of this industry, but they are but two elements only in the agricultural commerce, that is the backbone of this Dominion, and more particularly of Ontario. Other elements intricately interwoven into the dairying industry—are cattle and all farm stock. From the cattle comes the milk, and from the milk the butter and the cheese. The greater portion of the leather for the boots and shoes, harness, saddles, equipment for soldiers, upholstering materials and other products come from the cattle. Milk is associated inseparably with the successful raising of hogs and poultry, and as the primary essential to the beef product its value can hardly be even approximated. Nor is this all. The infant life of the nation depends to no small degree upon cows' milk. This is found in every household every day, year in and year out. It enters into almost every dish that is served, and certainly the great majority of delicacies, for milk is the first benefit for the invalid and the last resort of the whiskey sodden toper. It is used in a variety of ways. It is condensed and used not only all over the civilized world, but in ships scattered over the boundless seas. Of late years milk powder factories have sprung into being, and in this district alone, many farmers are producing heavy supplies for the milk powder factories at Belmont and Brownsville and the condensories at Aylmer and Tillsonberg.

The increased production of milk is due largely to the improvement of stock cows. In 1911, the last census shows in Canada 2,594,174 cows, an increase of only 185,502, compared with the census of 1901. The increase in the number of cows during the ten years was only 7 per cent. and the total increased production of milk for the same period 43 per cent. In 1901 the average yield per cow per year was 2,850 pounds which had risen in 1910 to 3,805 or an increase of 955 pounds per cow. It would have required an increase of 1,054,894 cows to have equalled the production of 1910 at the average yield of 1900. The total value of milk and its products in Canada, in 1900 was $66,470,953, in 1910, it was $109,339,934 and in 1913, approximately $123,000,000. Ontario must wake up. In Alberta and Saskatchewan she has healthy competitors. In these two provinces alone, the dairy products in 1901 represented a value of $1,276,050, and in 1910 $15,121,758 and they have made inroads on Ontario stocks.

Now what is the history of the cheese industry. I'm told that the first cows came with Champlain to Quebec in 1608 or 1610, and then when Le Motte Cadillac established a trading post on the Detroit River in 1701, he took with him some calves which were probably the first cows in Upper Canada. The first cheese maker was Harvey Farrington who came over from Herkimer, N.Y., to Ontario and in 1864 established the first cheese factory in Canada on the farm of G. V. de Long, in the Township of Norwich (Oxford), one at Ingersoll by James Harris, the Galloway factory in West Oxford, one by Andes Smith & Son at Norwich and a fourth at Nissouri by John Adams. Ingersoll, for many years remained as the

head centre for cheese production. Other factories sprang up in Eastern and Middle Ontario. There are 1,002 cheese factories in Ontario which produced 110,795,926 pounds of cheese, out of 1,209,890,000 pounds of milk worth $13,890,656. Now these statistics for Ontario are interesting as showing the progress in stock and the value of the output of:

CHEESE—ONTARIO.

| Year. | Milch Cows. | No. of Pounds. | Value. |
|---|---|---|---|
| 1881 | 669,629 | 22,372,566 | $2,201,712 |
| 1890 | 777,838 | 68,632,682 | 6,413,904 |
| 1900 | 976,124 | 127,789,543 | 13,023,025 |
| 1905 | 1,106,948 | 164,866,223 | 17,417,757 |
| 1910 | 1,052,796 | 135,521,390 | 14,491,410 |
| 1913 | 1,032,039 | 110,795,426 | 13,890,566 |

Happy am I to say that this County of Elgin contributed in a very substantial manner to this proud record. Let me give you the figures for the County of Elgin for these same years:

| Year. | Milch Cows. | No. of Pounds. | Value. |
|---|---|---|---|
| 1881 | 17,281 | 1,171,984 | $125,720 |
| 1890 | 18,308 | 2,459,109 | 229,225 |
| 1900 | 24,215 | 3,637,418 | 316,195 |
| 1905 | 26,704 | 4,760,774 | 499,879 |
| 1910 | 28,920 | 4,062,375 | 435,252 |
| 1913 | 26,356 | 2,448,235 | 310,030 |

In the case of cheese it is stated that the manufacture as well as the export is declining. In 1904 the high mark of export was reached with 233,080,000 pounds. Last year the figure was only 144,478,000 pounds. This is explained in part by the increased home consumption.

Now as to butter. I find that in 1875 the first creamery was started in Teeswater by John Ingles on the Schwartz or shallow pan system. They have been increasing every year until now there are 201 creameries in this province with an output of 12,893,650 pounds in 1910 valued at $3,016,135. In 1913 the output of butter was 20,629,555 pounds valued at $5,318,435. To this Elgin County contributed in 1910, 385,955 pounds worth $90,230 and in 1913, she yielded 478,938 pounds worth $126,117. Now let us see how Ontario compares with some of the milk producing American States. Ontario in the last year, 1913, for which my figures are complete had 1,032,039 milch cattle, yielding total products of $43,332,047. In the same year New York had 1,501,608 milch cattle yielding a total of $55,472,155. Michigan had 563,905 milch cattle which netted the State $16,903,087 in products; Wisconsin had 998,379 milch cattle, the products of which totalled $26,779,792. The figures analysed mean that the average cow in Ontario yielded products valued at $42.00 compared with an average yield per cow in New York of $36.00; an average yield per cow in Michigan of between $29.00 and $30.00 and about $27.00 for the cows in Wisconsin. This figured out on a percentage basis is astonishingly large.

I want, in closing, to show what is the record of this County of Elgin as a producer from the latest reports that I am able to obtain. I find that in poultry she comes fifth as a producer of turkeys with 26,865 birds; sixteenth in geese, of which she has 11,691; fifteenth for ducks, with a flock 11,906; and tenth with other fowl, with flocks totalling 370,042.

And then as to stock, I find she is thirteenth in the matter of horses with 20,873; eleventh with milch cows totalling 27,720; fifteenth with other cattle numbering 40,212; fifteenth also with sheep numbering 22,701 and tenth as a producer of swine with 60,051.

Then her record in the matter of field crop is interesting, although the figures may not mean very much when it is taken into consideration the great difference in the areas of the different counties in the Province of Ontario, the great diversity and the great difference in soil constituents. Elgin stands third as a producer of beans and third in corn for husking, fifth for fall wheat, sixth in the matter of garden produce, eighth in hay, clover and alfalfa, ninth in spring wheat, ninth in corn for silo, eleventh for pasture lands, fourteenth for rye, seventeenth for oats and mixed grains, fifteenth for orchards, ninth for small fruits, twentieth for buckwheat, nineteenth for sugar beets and vineyards, twenty-ninth for carrots, thirtieth for potatoes, thirty-fifth for peas, thirty-eighth for turnips and twenty-first in mangels.

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## ADDRESS.

Hon. James S. Duff, Minister of Agriculture for the Province of Ontario, Toronto.

I am very glad indeed to have the privilege of meeting with the Dairymen of Western Ontario in this their Forty-eighth Annual Convention, if only for a little while. I am pleased to know that your meetings have been of such a character that already it is a foregone conclusion that this is the best Convention that has ever been held under the auspices of your Association. That speaks volumes for those of you—and I am sure there must be a considerable number—who have been, for many years, regularly attending this Convention and taking an interest in the Association. There may be a few here who were at the first Convention held forty-eight years ago, and I can quite appreciate the fact that you can look back over those forty-eight years and feel that you owe a meed of credit to the gentlemen who inaugurated the Dairymen's Association for Western Ontario and who laid the foundations strong and deep of the organization which has proved of such immense value to the people of Western Ontario who have taken up dairying as a specialty in agricultural life.

Our friend, Mr. George A. Putnam, has in his office a map showing with little red spots the location of cheese factories and creameries in Ontario. It shows a very much larger percentage of cheese factories in Eastern Ontario than in Western Ontario, although the Eastern Association is your junior by ten years. That, however, is explained by the fact that during the last 35 or 40 years, there has been a feeling among the agriculturists of this Province that one of the things that the people require to know is what their own farms and what their own environment is best suited for. If you had had an opportunity of driving through Eastern Ontario and Western Ontario, you would realize that with the broken

country in Eastern Ontario and with the many rocky sections, dairying would be one of the branches of agriculture that could be carried on more successfully than any other line of farming, but once you get into Western Ontario you get into as fine a garden land and as fine an agricultural section as is to be found, possibly on the North American Continent. I have often thought that if a line were drawn from Port Hope or thereabouts, east of Toronto, taking in the Counties of Durham and Ontario, and continued to Midland and taking the rest of the Province west, you would have a peninsula containing land of such quality that I doubt on the whole of the North American Continent there is to be found—such splendid agricultural land with such splendid possibilities as we have in that particular section of Ontario!

Our friends in Eastern Ontario, who are not so fortunate, have adapted themselves to the conditions in which they find themselves and they have branched out into dairying, and they can carry it on successfully with the raising of hogs and sufficient feed for their cattle. This is done to such an extent that in many sections in Eastern Ontario that years ago were heavily mortgaged and where the people scarcely knew which way to turn, the farms are to-day free of mortgage and no more progressive or prosperous people are to be found in the Province.

Take the Counties of Essex and Kent and Elgin. The farmers in these counties grow a great deal of corn and raise a great many hogs, and they do not need to worry so much about dairying. In the County of Oxford and parts of Elgin and Middlesex, there are men who have been following dairying and the cattle trade for many years and they are staying by it to-day, and they can look back and feel that no mistake was made when they adopted dairying as their line of agricultural work.

I am told that you had one of the finest and most instructive meetings on dairy lines this afternoon that has ever been held by your Association. I think I might very well step away for a moment or two from a speech on dairying, because in the section of the Province in which I live, we are not given to dairying to any great extent. We are what might be called a mixed farming section. We grow grain and raise cattle and we ship considerable cream to Toronto and to the City of Hamilton, but we are not what might be called a dairy section. We have farmers here and there who have ten or twelve cows, but that is an exception to the rule. Our average farmers do not keep more than seven or eight cows, but the man who would be a dairymen in this section of Ontario and who only keeps seven or eight cows would not be considered a dairyman. One of the purposes of our Department has been to not only encourage the dairy industry, but to encourage all lines of agriculture, and I have always felt that I would like to see young men who are starting out in life on the farm, devote their energies in directions that seem palatable to themselves. I do not think any man will make a success of dairying unless he is fond of cows and fond of milking. One has got to love the line of agriculture to which he devotes his life or he will not make a success of it. If you look around your section you will find that the men who have made a success of farming are the men who were not only fond of their cattle and their horses and their sheep and swine and their fields and woods and orchards, but they are men who have loved these things. They may like to spend a day or two in the city, but they love to enjoy God's free air as only the farming community can enjoy it, and they love to get back to the freedom of country life and the beauties of nature. (Applause.)

Many of you, no doubt, have read the correspondence that took place in the first two or three days of August between Sir Edward Grey, the Foreign Secretary of the British Government, and Sir Edward Goschen, the British Ambassador at

that time in Berlin, and between Sir Edward Grey and the Chancellor of Germany, and between the British Government and the other Governments involved in this terrible war. You cannot read that correspondence or go through the files of what is called the "White Paper" which gives all the correspondence in connection with this matter, without feeling that the British people, to the very last minute, did all they possibly could to prevent the war. But they said, "We will not see the neutrality of Belgium violated; we will not see that little nation trampled under foot; we will not see an injustice done to them," and Great Britain gave Germany up until twelve o'clock on the night of the 4th of August to say what she would do, and if she insisted on violating Belgium's neutrality, England would declare war. What would happen this Canada of ours if England had sat quietly by and allowed the Germans to trample Belgium down and then to trample under her heel the French Republic? The next thing they would do would be to trample down England and Canada. Have you ever thought that for forty years the Germans were preparing for this war, and well they might. For many years back, their problem has been congestion of population. They have 300 people to the square mile. For the last forty years the best blood of their young men and women have been leaving Germany and going to the United States and coming to Canada and to other parts of the world, and that has galled the German people, and they hoped for a time when they would be sufficiently strong to crush the other nations and have colonial possessions of their own, and with that thought in their minds, when the German nation would be the greatest in the world, they have been getting ready for this war, expecting that the result of it would be to give Germany world power. The declaration of war by Great Britain has done more to lift the British Empire in the eyes of the civilized world than anything that has taken place since the Napoleonic war. There was no thought in the mind of the German Chancellor that England would declare war. The Germans thought that England had Home Rule troubles; they thought that India would rebel or South Africa would rebel and that Australia and New Zealand would want to get away from the British connection, and they thought that Canada would leave the old Mother Land to take care of herself, but the moment the Old Lion growled, the whelps answered her call, and from Canada, India, South Africa, Australia, New Zealand and the Islands of the Sea, the British people the world over came to the aid of the Mother Land in such a way that the British people are lifted in the eyes of the outside world in a most remarkable way. This war cannot end until the militaristic spirit that brought it on has been crushed and crushed forever. (Applause.)

Germany was the only nation that was fostering a military spirit. England had a few thousand regulars, but they were not men who were brought in by conscription; they were men who in the ordinary way enlisted for twenty-one years, and England was unprepared; Russia was unprepared and so was France, but during the past few months, the Russians have come to the front in a most magnificent way, and Russia has 1,200,000 men who come to the fighting age every year. Fancy the power of an Empire that has so many men coming to the fighting age each and every year.

At the conclusion of the Hon. Mr. Duff's address, the audience rose spontaneously and sang, "It's a Long Way to Tipperary," after which the meeting was closed by the singing of "God Save the King."

## PRIZE WINNERS, 1915..

REPORT PRESENTED BY MR. FRANK HERNS.

### *September White Cheese.*

1. H. E. Donnelly, Straffordville; 97.15.
2. J. Cuthbertson, Stratford; 97.07.
3. C. J. Donnelly, Scottsville; 96.99.
4. H. Hammond, Moorefield; 96.99. (Won on flavor).
5. Carter Bros., Stratford; 96.98.

### *September Colored Cheese.*

1. H. E. Donnelly, Straffordville; 97.57.
2. D. Menzies, Listowel; 97.56.
3. H. Youn, Molesworth; 97.23.
4. J. K. Brown, Ethel; 96.99 (won on flavor).
5. Leslie Silver, Mapleton; 96.99.

### *October White Cheese.*

1. J. K. Brown, Ethel; 98.16 (silver cup).
2. L. H. Schneider, Gads Hill; 97.65.
3. Geo. Empey, Atwood; 97.33.
4. H. Youn, Molesworth; 96.98.
5. C. J. Donnelly, Scottsville; 96.83.

### *October Colored Cheese.*

1. D. Menzies, Listowel; 96.99 (tie).
1. C. M. Firby, St. Thomas; 96.99 (tie).
3. Geo. Empey, Atwood; 96.91.
4. C. J. Donnelly, Scottsville; 96.83.
5. H. E. Donnelly, Straffordville; 96.82.

### *Winter 56-lb. Box Creamery Butter.*

1. R. C. Bothwell, Hickson; 97.49.
2. Jno. Cuthbertson, Stratford; 96.49.
3. W. Webb, St. Thomas; 95.66.
4. E. M. Johnston, Innerkip; 95.49.
5. Mack Robertson, Belleville; 95.16.

### *Twenty 1-lb. Creamery Prints.*

1. E. M. Johnston, Innerkip; 96.99.
2. C. Klockman, Stratford; 96.82.
3. R. C. Bothwell, Hickson; 95.83.
4. Mack Robertson, Belleville; 95.66.
5. H. A. Clark, Warwick; 95.49.

### *56-lb. Box Creamery Butter.*

1. I. C. Goodhand, Parkhill; 97.15.
2. H. A. Clark, Warwick; 96.16.
3. Jno. Cuthbertson, Stratford; 95.49.
4. W. Webb, St. Thomas; 95.48.
5. Guelph Creamery Co., Guelph; 95.15.

### *Three September Stilton Cheese (10 lbs.).*

1. H. E. Donnelly, Straffordville; 96.98.
2. Jas. McKenzie, Verschoyle; 96.33.
3. H. Youn, Molesworth; 96.14.

### *Two September Flat Cheese.*

1. H. Hammond, Moorefield; 97.83.
2. H. Youn, Molesworth; 97.33.
3. C. J. Donnelly, Scottsville; 96.99.

SPECIAL PRIZES.

By the Heller & Merz Co., 22 Cliff Street, New York—C. Richardson & Co., St. Mary's, Ont., Canadian Agents for Alderney Butter Color: $10.00 in cash—To the Buttermaker securing the highest score on butter exhibited in Class III., colored with Alderney Butter Color.—R. C. Bothwell, Hickson.

$5.00 in Cash—To the Buttermaker securing the second highest score on butter exhibited in Class III., colored with Alderney Butter Color.—C. Klockman, Stratford.

By C. Richardson & Co., St. Mary's: $10.00 in cash—To the Buttermaker securing the highest score on butter exhibited in Class IV., colored with Alderney Butter Color.—H. A. Clark, Warwick.

$5.00 in Cash—To the Buttermaker securing the second highest score on butter exhibited in Class IV., colored with Alderney Butter Color.—Jno. Cuthbertson, Stratford.

*Note.*—The winners of the Heller & Merz Co. and C. Richardson & Co.'s special prizes will, if required, be expected to take an affidavit stating that they have been continuous users of Alderney Butter Color during the past twelve months.

By the R. M. Ballantyne, Limited, Stratford, Ont., for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Rennet Extract—To the Cheesemaker securing the highest score on September White Cheese, Class I., Sec. 1.—H. E. Donnelly, Straffordville.

One case of Hansen's Cheese Color—To the Cheesemaker securing the highest score on October Colored Cheese, Class II., Sec. 2.—D. Menzies, Listowel.

By C. H. Slawson & Co., Ingersoll, for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Cheese Color—To the Cheesemaker securing the highest score on September Colored Cheese, Class I., sec. 2.—H. E. Donnelly, Straffordville.

One case of Hansen's Rennet Extract—To the Cheesemaker securing the highest score on October White Cheese, Class II., sec. 1.—J. K. Brown, Ethel.

*Note.*—All cheese competing for the special prizes offered by the R. M. Ballantyne, Limited and C. H. Slawson & Co., must be made with Hansen's Extract and Color. No special cheese required.

By the J. B. Ford Co., Wyandotte, Mich., manufacturers of Dairymen's Cleaner and Cleanser: One three-piece Carving Set, genuine stag horn handles with silver mounting—To the Cheesemaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the best finished and most stylish looking cheese on exhibition.—J. K. Brown, Ethel.

One three-piece Carving Set, genuine stag horn handles with silver mounting—To the Buttermaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the neatest and most attractive exhibit of butter.—E. M. Johnston, Innerkip.

*Note.*—All exhibits (except Stilton and flat Cheese) are eligible for these two special prizes.

By the Canadian Salt Co., Windsor, Ont., E. G. Henderson, Manager: $25.00 in cash—To the Cheesemakers securing the highest score on cheese (except flats and Stiltons) exhibited in any class. To be divided as follows: 1st, $10; 2nd, 8; 3rd, 7.—1—J. K. Brown, Ethel; 2—L. H. Schneider, Gads Hill; 3—H. E. Donnelly, Straffordville.

$25.00 in cash—To the Buttermakers securing the highest score on butter exhibited in any class. To be divided as follows: 1st, $10; 2nd, $8; 3rd, $7.—1—R. C. Bothwell, Hickson; 2—I. C. Goodhand; 3—E. M. Johnston, Innerkip.

By the Western Salt Co., Courtwright, Ont., N. A. Leach, Manager: One barrel Purity Cheese Salt—To the Cheesemaker securing the highest score on September White Cheese, Class I., Sec. 1.—Tie: H. E. Donnelly, Straffordville; C. M. Firby, Paynes Mills.

One barrel Purity Cheese Salt—To the Cheesmaker securing the highest score on October Colored Cheese, Class II., sec. 2.—D. Menzies, Listowel.

One barrel Purity Dairy Salt—To the Buttermaker securing the highest score on fifty-six pound box Creamery Butter, Class III. or IV., Sec. 1.—R. C. Bothwell, Hickson.

One barrel Purity Dairy Salt—To the Buttermaker securing the highest score on twenty-one pound Creamery Prints, Class III., Sec. 2.—E. M. Johnston, Innerkip.

*Note.*—No special butter or cheese required.

By the DeLaval Dairy Supply Company, Limited, Montreal, Canada: A Silver Cup—To the Buttermaker securing the highest score on butter made during the month of October from collected cream, Class IV., Section 1.—I. C. Goodhand, Park Hill.

*Note.*—No special butter required.

By the W. A. Drummond & Co., Toronto: $10.00 in cash—To the Buttermaker securing the highest score on 56-lb. Box Butter made from collected cream pasteurized and properly ripened, Class III., Section 1., or Class IV., Section 1.—R. C. Bothwell, Hickson.

*Note.*—No special butter required.

By Wells & Richardson & Co., Montreal: A Fountain Pen—To each Buttermaker securing a score over 93 points on butter exhibited in any class with Wells & Richardson's improved Butter Color.—Mack. Robertson, Belleville; Jno. V. Capling, West Monkton; Guelph Creamery Co., Guelph; Jno. Anderson, Renfrew.

$10.00 in cash—To the Buttermaker securing the highest score on butter exhibited in any class colored with Wells & Richardson's improved Butter Color.— Mack. Robertson, Belleville.

*Note.*—No special butter required.

By the Dominion Chemical Co., Syracuse, F. W. Valleau, Kingston, Canadian Agent for Dominion Cleanser: $5.00 in Gold—To the Cheesemaker who is a regular user of Dominion Cleanser having the neatest and most attractive exhibit of cheese.—J. C. Donnelly, Scottsville.

$5.00 in Gold—To the Buttermaker who is a regular user of Dominion Cleanser having the neatest and most attractive exhibit of butter.—E. M. Johnston, Innerkip.

*Note.*—All exhibits (except Stilton and flat cheese ) are eligible.

By the Imperial Bank of Canada: A Silver Cup—To become the property of the Cheesemaker securing the highest total score, three times, or twice in succession, on two cheese; one cheese either white or colored, exhibited in Class I., and one cheese either white or colored, exhibited in Class II. In awarding this cup the scores of the two cheese securing the highest score in Classes I. and II. (belonging to the same exhibitor) will be added. In case of a tie, settlement is to be left with the judges. Won in 1910 by J. E. Stedelbauer; won in 1911 by R. A. Thompson; won in 1912 by D. Menzies; won in 1912 by R. E. Hastings; won in 1914 by Mrs. O. Cuckow.—J. J. Brown, Ethel.

*Note.*—No special cheese required.

Cheese Buyer's Trophy: Challenge Cup, valued at $150—To become the property of the exhibitor of cheese (except flat and Stiltons) at the Winter Dairy Exhibition who shall receive the highest score three times, or twice in succession. Won in 1903 by Frank Boyes; won in 1904 by R. H. Green; won in 1905 by O. Schwietzefr; won in 1906 by J. Patton; won in 1907 by J. E. Stedelbauer; won in 1908 by Mary Morrison; won 1909 by J. T. Donnelly; won 1910 by Mary Morrison; won in 1911 by B. F. Howes; won in 1912; by D. Menzies; won in 1913 by R. E. Hastings; won in 1914 by Geo. Empey.—J. K. Brown, Ethel.

*Note.*—Cheese without a bandage will be considered unfinished, and shall be scored off for finish accordingly.

Cheese on exhibition may be paraffined.

All one-pound print butter on exhibition must be wrapped in plain wrappers.

All October butter must be sent to London Cold Storage by Nov. 10th.

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## REPORT OF CHIEF DAIRY INSTRUCTOR AND SANITARY INSPECTOR, 1914.

FRANK HERNS, LONDON.

I beg to submit my Eighth Annual Report. During the past season five cheese and three creamery instructors were employed. Mr. Mack Robertson resigned as creamery instructor and Mr. G. Rickwood was engaged. The usual short course at the O. A. C., Guelph was attended by the instructors and much appreciated by them.

### CHEESE INSTRUCTION REPORT.

CHEESE FACTORIES.—146 cheese factories, 11 of which were combined factories were given 373 full day visits and 473 call visits, a total of 816 visits by the cheese instructors.

Six cheese factories were burned during the season and at least 3 of these are being rebuilt.

The closing down of several condensed milk factories increased the fall output of a number of cheese factories.

WHEY BUTTER.—Two factories made whey butter part of the season.

CASEIN.—Four factories made casein, two less than last year.

Milk Supply.—9,542 patrons supplied milk to the cheese factories. The estimated average of fat in the milk for the season was 3.42 per cent., and of the loss of fat in the whey .217 per cent.

Patrons Visited.—211 patrons were visited.

Pay by Test.—24 factories pay for milk by the test.

Cool Curing Rooms.—13 factories have ice cool curing rooms.

Pasteurize the Whey.—80 factories or about 70 per cent. pasteurized the whey and 7 factories fed all or a portion of the whey at the factory.

Quantity of Cheese.—The cheese factories produced in 1913, 21,055,531 lbs. of cheese and in addition produced during the winter months 932,065 lbs. of butter. The output of cheese for 1914 will be greater than in 1913. The instructors report 70 factories making more cheese than in 1913. The returns for 1914 will be obtained about June next.

Average Yield and Price.—The average yield (lbs. of milk to make a lb of cheese) in 1913 was 11.18. The average price (per lb. of cheese) was 12.72 cts. The early part of the season of 1914 gave a good average price and after the month of August cheese sold at the highest prices ever realized in Canada.

Quality of Cheese.—The cheese up to the middle of July was very fine. During the weeks of extreme warm weather several factories were troubled with open cheese. This was remedied as rapidly as possible and we have received very few complaints regarding the quality of the later made cheese. Very few acidy cheese were reported.

Some complaints regarding the finish of some cheese the past year has been received and I trust the makers who have been at all careless on this point will realize the error of turning out any poorly finished cheese, not only from the harm it does their personal reputation but also the general reputation of Western Ontario cheese.

If business conditions will permit we would suggest that buyers visit the factories more frequently. With all due respect to the opinion of others we doubt the advisability of depending entirely on warehouse inspection.

Greater care might be taken in some cases in loading the cheese on the cars. A few years ago men were sent out to inspect and ship each purchase of cheese, but lately less of this work apparently is done, which, no doubt, tends in a few cases to slack methods at the shipping point.

The period of warm weather was short the past season and a greater number of patrons are each year paying attention to the care of the milk.

Annual and District Meetings.—From Nov. 1st, 1913, to Oct. 31st, 1914, a total of 83 factory meetings were attended by the instructors and myself. Total attendance 4,510.

Prosecutions.—Eight patrons pleaded guilty before police magistrates to delivering deteriorated milk to cheese factories. This is the smallest number since the present system was started and indicates that this offence is becoming a thing of the past.

Expenditure for Improvements.—$13,336.00 was expended by the cheese factories in general improvements.

Sanitary Conditions.—109 cheese factories are reported as kept in good sanitary condition. The others are fair. 13 factories are kept in poor sanitary condition and will be expected to improve next year.

The Milk Sediment Test.—Bacteriologists have shown and frequently call attention to the fact, that large numbers of bacteria may be carried into milk, the organisms clinging to substances such as bits of straw, hay, hairs, road dust, stable

## INSTRUCTION WORK 1914.—CHEESE.

| Instruction and Group. | Factories visited. | No. of Patrons. | No. of full day visits. | No. of call visits. | No. of Patrons visited. | No. of curd tests made. | No. of lactometer tests made. | No. of Babcock tests for adulteration. | No. of Sediment tests made. | Factories making "Whey Butter." | Factories paying by test. | Factories having cool curing rooms. | Factories pasteurizing whey. | Whey feed at factory. | Average per cent. fat in milk for season. | Average per cent. fat lost on whey for season. | Estimated expenditure for improvements. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | $ c. |
| LISTOWEL— | | | | | | | | | | | | | | | | | |
| R. A. Thompson ..... | 31 | 2,215 | 62 | 122 | ..... | ..... | 3,416 | 21 | 1,844 | ..... | 6 | 3 | 20 | 2 | 3.35 | .216 | 1,096 00 |
| STRATFORD— | | | | | | | | | | | | | | | | | |
| Geo. M. MeKenzie .... | 27 | 2,123 | 97 | 89 | 27 | 72 | 4,285 | 100 | 2,383 | ..... | 12 | 7 | 19 | 3 | 3.42 | .217 | 5,365 00 |
| INGERSOLL & WOODSTOCK | | | | | | | | | | | | | | | | | |
| A. E. Gracey ..... | 31 | 1,387 | 72 | 112 | 58 | 106 | 2,963 | 552 | 1,021 | 1 | 6 | 2 | 19 | ..... | 3.43 | .224 | 1,755 00 |
| SIMCOE & BRANTFORD— | | | | | | | | | | | | | | | | | |
| Geo. Travis..... | 24 | 1,573 | 56 | 73 | 83 | 48 | 3,608 | 357 | 1,312 | ..... | ..... | 1 | 8 | 1 | 3.50 | .220 | 1,375 00 |
| LONDON— | | | | | | | | | | | | | | | | | |
| T. F. Boyes ..... | 33 | 2,244 | 86 | 77 | 43 | 41 | 3,094 | 256 | 2,002 | ..... | ..... | ..... | 14 | 1 | 3.43 | .221 | 3,745 00 |
| Totals and Averages .. | 146 | 9,542 | 373 | 473 | 211 | 267 | 17,366 | 1,286 | 8,562 | 1 | 24 | 13 | 80 | 7 | 3.42 | .217 | 13,336 00 |

dust, fecal material, etc., and that some definite relation exists between the keeping quality of the milk and the amount of sediment it may contain.

Cooling the night's milk to at least 65 degrees is absolutely necessary under any conditions, and, if greater care can be exercised in the milking, the number of troublesome organisms which have to be controlled should be fewer and thus an important improvement gained.

The sediment test was carried by each of the cheese instructors the past year.

REMARKS.—1. The test is a simple method of accumulating in one spot, where it may be seen, the amount of sediment contained in a pint of milk and thus enable the operator to judge approximately from the appearance of the "disk" the total sediment in a can of milk.

2. It places the responsibility for unclean milk on the individual patron. With few exceptions milk producers take a reasonable view of the test and look upon it as something that indicates not only the better methods of the careful patron but reveals the shortcomings of the careless neighbor.

3. After one season's work which included several thousand tests we look for good results from the continued use of the test. Each patron can see and understand it and its use awakens personal pride in the careless patron, creating a desire to have the milk delivered in a clean, satisfactory condition.

SUMMARY OF CREAMERY REPORT, 1914.

| | Instructors. | | | |
|---|---|---|---|---|
| | D. McMillan. | J. Smith. | G. Rickwood. | Total |
| No. Creameries visited | 44 | 42 | 40 | 126 |
| No. of patrons sending cream | 13,745 | 8,753 | 9,228 | 31,726 |
| Pounds of butter made, 1913 | ..... | ..... | ..... | 17,404,314 |
| Gain over 1912 | ..... | ..... | ..... | 4,593,047 |
| No. full days visits | 115 | 147 | 96 | 358 |
| No. call visits | 12 | 7 | 46 | 65 |
| No. patrons visited | 45 | 120 | 19 | 184 |
| Average per cent. fat in cream | 26.75 | 26.70 | 28.20 | 27.21 |
| No. tests made for moisture in butter | 237 | 222 | 126 | 585 |
| Average per cent. moisture in butter | 14.61 | 14.90 | 14.53 | 14.68 |
| No. samples showing over 16 % moisture. | 16 | 3 | 6 | 25 |
| No. creameries these samples taken from | 11 | 2 | 6 | 19 |
| No. of tests made for salt in butter | 223 | 214 | 119 | 556 |
| Average per cent. salt used in butter | 5.18 | 5.60 | 5.30 | 5.36 |
| Average per cent. salt left in butter | 3.07 | 3.36 | 3.23 | 3.22 |
| No. of creameries cream collecting | 44 | 41 | 34 | 119 |
| " " C. C. and Separator | ..... | 1 | 6 | 7 |
| " using Babcock test | 40 | 42 | 40 | 122 |
| " " " oil test | 4 | ..... | ..... | 4 |
| " " " scales (Metric) | 20 | 13 | 18 | 51 |
| " " " Pipette | 20 | 29 | 22 | 71 |
| " " " cooler | 19 | 14 | 23 | 56 |
| " " " Pasteurizers | 9 | 5 | 10 | 24 |
| " " " Culture | 2 | 2 | 8 | 12 |
| " " having poor water supply | 1 | 3 | 3 | 7 |
| " " " Septic tank for disposal of sewage | 2 | 3 | 8 | 13 |
| " " making casein | ..... | ..... | 1 | 1 |
| Average temperature of storage | 46.4 (3) | 42. (2) | 49.4 (1) | 44.6 (5) |
| Expenditure { New creameries | $13,044 00 | $10,000 00 | $ 4,000 00 | $27,044 00 |
| Expenditure { General improvements | 19,227 00 | 15,430 00 | 13,585 00 | 48,242 00 |
| Totals | $32,271 00 | $25,430 00 | $17.585 00 | $75,286 00 |

### Creamery Instruction Work, 1914.

One hundred and twenty-six creameries were visited by the three creamery instructors; in addition seventeen cream shipping stations. This makes a total (without the shipping stations) of 272 cheese factories and creameries which is nine more factories than the total of cheese factories and creameries in 1907. Several new creameries were opened the past year and two or three have been closed. The prices for butter in the early part of the season of 1914 were very discouraging but later recovered, giving a fair average price for the season. Some cream, chiefly from the South Western Peninsula, was shipped across the border during the fall months.

Quantity of Butter, 1913.—Western Ontario creameries produced 17,404,-314 lbs. of butter in 1913. This includes 2,722,739 lbs. of butter manufactured by the several Toronto creameries a portion of the cream for which was produced in Eastern Ontario. If we include the 932,065 lbs. of butter made at the cheese factories in winter we have a total of 18,336,376 lbs. This is nearly three times the amount manufactured in 1907.

Patrons and Cream.—31,726 patrons supplied milk and cream to the creameries. The average per cent. of fat in the cream was 27.21.

Creamery Visits.—358 full day visits and 65 call visits, making a total of 423 visits were made by the instructors to the creameries.

Moisture in Butter.—585 tests for moisture were made. The average moisture was 14.68 per cent. A proportion of these tests were made at each creamery. 25 samples contained over 16 per cent. moisture. The later samples were taken from 15 creameries.

Salt.—556 salt tests were made. The average amount of salt used was 5.36 per cent. and the average amount of salt left in the butter was 3.22 per cent. This is a point that should be given special attention by the buttermakers as we have some complaints from the buyers that a portion at least of Western Ontario butter is still too heavily salted. We are convinced that if an effort is put forth by every buttermaker to reduce the salt content and secure more uniformity one of the chief defects of Western Ontario butter would be eliminated. Let us make a special effort on this point during the coming season.

Testing Cream.—51 creameries now use the scale for weighing cream samples. Four creameries only, still use the oil test.

Pasteurization.—25 creameries pasteurized the cream, some of these only part of the time. This however is an increase of 8 over any previous year.

Storage.—44.6 degrees was the average temperature for creamery storages.

Coolers.—56 creameries use coolers for cooling the cream.

Culture.—12 creameries use culture.

Casein.—2 creameries made casein.

Sewage Disposal.—13 creameries now have septic tanks for the disposal of sewage. Most of these tanks are working well.

Sanitation.—61 creameries are reported kept in first class sanitary condition. 51 creameries kept in very fair sanitary condition. 20 creameries kept in fair sanitary condition. 4 creameries kept in poor sanitary condition. The latter will be required to improve for 1915.

Expenditure.—Eight new creameries were built at an estimated cost of $27,044.00 and $48,242.00 was expended in general improvements, making a total expenditure of $75,286.00.

District Meeting.—The usual Annual Cheese and Creamery Meeting was

held at Guelph during the time of the Winter Fair. There was a large attendance and many interesting subjects were discussed. A report of the meeting will, no doubt, be published as in former years, as an addition to the Dairymen's Association reports.

Cream Cooling Experiments.—In 1913 we did some work to find out the cost of cooling raw cream by different methods. A report of this work was given at the last Convention.

Last year we tried different methods of cooling pasteurized cream. I wish to thank Mr. Scott for so kindly giving us the use of his creamery and Mr. McMillan who did the experimental work.

Conclusions (Cream cooling).—(1) Where cream was pasteurized to 185 degrees and one cooler used either with brine or ice water it was found that it required considerable more work and a large amount of ice to cool cream to churning temperature. This method appears to be impractical.

(2) When two coolers were used and cold water run through the first cooler, then brine or iced water run through the second cooler it was found possible to cool cream with less ice and less loss of fat in the buttermilk than was the case when water was used only through the one cooler and the cooling finished with ice and water around the cream in the vat.

Observations and Some Suggestions for Improvement.—A warm spell in summer sees a percentage of over ripe and tainted milk arriving at some of the factories. A few of our makers fearing competition from other sources are in a position to return only the worst of this milk. The poorly cared for milk goes in with the best milk and lowers the quality of the day's make of cheese. When undesirable cheese is made from such milk it is sometimes hurried on to the home market with uncertain results. The patrons should more fully realize that when milk is delivered in a condition unfit for making fine cheese their own business is affected.

We have many patrons who take good care of the milk but there is still the "Don't care patron" who excuses his short comings by saying, "My milk passed anyway, why should I worry?"

Every patron should consider it his duty to deliver well cooled milk during the warm weather and the makers should assist the instructors so far as possible to get such milk, by rejecting all undesirable milk at the weigh stand.

Wherever clean, cool milk is delivered as a practice the greatest progress is being made.

Some of the late fall cheese should receive more attention in curing. A more uniform temperature of about 60 degrees should be maintained.

If the creamery men will make out a list of the patrons who send low testing or poor cream and arrange for the instructor to visit these patrons, many undesirable conditions may be changed. A letter might be drafted by the Department to cover these special cases. This would take any onus off the creamery men.

Unfortunately a few creamery men gather cream only once in four or five days and in some cases once a week. A few lack proper equipment for cooling the cream at the creamery.

Competition has evidently forced some creameries that ship cream to allow their patrons to ship at any time, in fact some cans remain at the express office over night even in the warmest weather. At one time they demanded the cream must be shipped on the first train in the morning. Cannot these conditions be remedied to the advantage of all concerned.

More attention should be paid by some factory men to the tidiness of the

factory and the outside appearance and surroundings, if the patrons are to point with pride to the factory as an attractive community institution.

In closing I wish to again thank the instructors for their hearty co-operation in the work of the past year. They have worked hard to improve the dairy products turned out from their respective groups and each year sees substantial progress made. I also wish to thank the President and the Directors of the Association, the buyers, factorymen, patrons and all in the trade for their hearty support and good will. All of which is respectfully submitted.

We will have higher prices for rennet next year and some of the makers may think they can use less rennet than formerly and thus save some of the extra cost, but that will be a great mistake. I think we should try and get a little more money for our work so that we can afford to use the same amount of rennet.

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## SUMMARY OF EXPERIMENTAL WORK IN BUTTERMAKING, MILK AND CREAM TESTING, ICE CREAM MANUFACTURE.

H. H. Dean, Professor of Dairy Husbandry, O.A.C., Guelph.

### Buttermaking.

Loss of Fat in Buttermilk by Pasteurizing Sour Cream.—The loss of fat in the buttermilk was greater by pasteurizing sour cream at 140°F., as compared with churning raw cream, and less by heating to 140°F., as compared with heating to 160° to 180°F. A "holder" pasteurizer was used for the tests. The average percentages of fat in the buttermilk were .142 from raw cream, .275 for cream pasteurized at 140°, and .37 for the lots heated to 160° to 180°F. In one churning where the pasteurized cream was held in the vat over night and the temperature rose several degrees the percentage of fat in the buttermilk was .48, indicating that where the cream is not held for some time at a comparatively low temperature before churning, there is likely to be an excessive loss of fat in the buttermilk when such cream is churned.

Moisture and Salt in Butter, Working with Churn Tap Open and Closed.—The average of 12 churnings gave the following results:—

| | 1914 | 1913 |
|---|---|---|
| Average per cent. moisture in finished butter, tap open | 14.46 | 14.31 |
| " " " " " " closed | 14.34 | 14.55 |
| " " salt " " " closed | 3.095 | 2.98 |
| " " " " " " open | 2.95 | 2.81 |

Jacketed *vs.* Milk Cans for Cream Collecting from Farms.—The average temperature of six deliveries of cream in hot weather, jacketed cans was 64.3°F. and in milk cans 67.5°F. The average percentages of acidity in the cream was practically the same in both cans.

A New Salt Test.—Recently a test for the salt on butter has been brought to the attention of buttermakers known as the "Chapman Salt Test." Comparing this test with the Standard Silver Nitrate test, we found it gave results rather higher. The average of 29 tests with silver nitrate was 2.76 per cent. salt. The average of 29 tests made on the same lots of butter by the Chapman test was 3.26 per cent. salt in the butter.

Five Brands of Butter Salt.—Early in the season of 1914 we got representative samples of the brands of butter salt most largely used by Western Ontario

buttermakers to the number of five. These were tested in the Chemical Laboratory of the college for purity (% Na. Cl.) and solubility. The Dairy Department compared them as to percentage of salt retained in the finished butter, percentage of moisture in butter, and effect on quality of butter.

| —— | % Na Cl. | No. grams soluble per 100 c.c. water at 65°F. | % Salt in butter. | % moisture in butter. | Av. score of butter. |
|---|---|---|---|---|---|
| No. 1 (W.S.)..... | 97.5 | 30.4 | 2.96 | 14.00 | 91.01 |
| " 2 (C.S.) ( 4 Omesh)... | 96.3 | 30.6 | 3.21 | 14.16 | 91.37 |
| " 3 (C.S.) (50 " ... | 96.3 | 30.5 | 3.17 | 14.46 | 91.62 |
| " 4 (C.B.)..... | 94.6 | 29.9 | 3.28 | 14.40 | 90.95 |
| " 5 (D.C.)..... | 95.7 | 30.5 | 3.18 | 14.10 | 90.66 |

All conditions were as nearly alike as possible for each brand of salt. Salt was added in all cases at the rate of ¾ oz. salt per lb. butter after draining the butter in the churn.

SALT *vs.* SALTLESS BUTTER.—The salt butter produced an increased overrun of 4.14 per cent. as compared with making saltless butter. In 1913, the overrun was 3.5 per cent. greater on the salt butter.

BUTTERMILK FROM CREAM OF DIFFERENT PERCENTAGES OF FAT.—The average of 44 churnings, ranging in weight of cream from 160 lbs. to 1,514 lbs., and in percentage of fat from 28 to 41.5, was 1.47 lbs. of buttermilk per lb. butter, or 2,940 lbs. per ton of butter. For each increase of 1 per cent. fat in the cream above 28, there was produced, on the average, 158 lbs. less buttermilk per ton of butter.

## MILK AND CREAM TESTING.

COMPARISON OF HART AND WALKER CASEIN TESTS; AND COMBINED CASEIN FAT TEST WITH SEPARATE CASEIN MILK AND FAT TESTS.—During the season 88 samples of factory milk were tested by these four methods. Composite samples for one week and for a month were also made of the daily samples using a 3: 1 potassium bi-chromate, bichloride of mercury preservative and also creosote for Hart and Walker casein tests.

| —— | —— | April. | May. | June. | July. | August. |
|---|---|---|---|---|---|---|
| Hart Casein Test... | Av. daily tests, % casein.... | 2.088 | 2.05 | 1.96 | 1.99 | 2.01 |
| | " weekly coms. " .... | (1) 2.85 | 3.73 | 3.03 | 2.20 | 2.65 |
| | " " " .... | (2) 2.70 | 2.30 | 2.66 | 2.22 | 2.65 |
| | " monthly " .... | (1) 2.30 | ..... | 2.40 | 2.30 | 2.7 |
| | " " " .... | (2) 2.50 | ..... | 2.30 | 2.30 | 2.8 |
| Walker Casein Test. | Av. daily tests % casein.... | 2.087 | 2.07 | 2.03 | 2.08 | 2.11 |
| | " weekly " .... | (1) 2.1 | 2.10 | 2.03 | 2.10 | 2.65 |
| | " " " .... | (2) 2.1 | 2.13 | 2.02 | 2.05 | 2.17 |
| | " monthly " .... | (1) 2.2 | ..... | 2.1 | 2.20 | 2.30 |
| | " " " .... | (2) 2.2 | ..... | 2.1 | 2.30 | 2.30 |
| Babcock Fat ..... | Av. daily % fat..... | 3.56 | 3.55 | 3.56 | 3.42 | 3.35 |
| Babcock & Hart.... | " " " fat and casein.. | 5.647 | 5.55 | 5.52 | 5.41 | 5.36 |
| Babcock & Walker.. | " " tests " .. | 5.647 | 5.62 | 5.59 | 5.50 | 5.46 |
| Combined Casein Fat Test ..... | Av. daily tests % casein-fat. | 5.47 | 5.40 | 5.41 | 5.33 | 5.56 |
| | " " " " " | (1) 5.40 | 5.53 | 5.75 | 5.75 | 5.90 |
| | " monthly " " " | (1) 5.40 | ..... | 5.80 | 5.80 | 6.00 |

(1) 3:1 Potassium bichromate, bichloride mercury preservative used.

(2) Creosote preservative used in composite samples.

Comparing Hart and Walker casein tests with fresh milks we find the Walker test gives slightly higher percentages, but for all practical purposes they may be said to agree when testing new milk samples. The composite samples, both weekly and monthly, with both preservatives gave results much too high when using the Hart test, while the Walker gave results concordant with the average of daily tests in both weekly and monthly composite samples, and with both kinds of preservatives. It thus has an advantage over the Hart test in this respect.

Comparing the combined casein-fat test with the average percentages of fat as determined by the Babcock test plus the average of daily tests for casein as determined by Hart and Walker tests, we find the average daily tests of the combined, to be slightly lower (one month it was higher), while the composite samples with potassium bichromate—corrosive sublimate preservative, tend to run rather higher —at least this was the case during three months out of five. On the whole, the results with the combined casein-fat tests agree fairly well with the results got by using separate tests for casein and fat. The creosote preservative does not give results with the combined test.

Shaking *vs.* Not Shaking Open and Closed Composite Cream and Milk Samples.—During the months of April, May, June, July and August, 38 deliveries of cream were placed in pint milk bottles, containing a 3:1 potassium bichromate-corrosive sublimate preservative. One sample bottle was corked and sample bottle shaken at each time of adding fresh cream; one was corked and not shaken; one was left open and shaken, and one left open and not shaken.

The open bottle samples, as a rule tested much higher than the average of each delivery. The shaken, corked samples contained most mould, the uncorked samples least. The practical lesson is to cork cream composite samples and not shake them when adding fresh samples. Out of 61 monthly composite samples of milk kept in open and closed bottles during April to September, 23 samples were alike in fat percentage at the end of a month, while the remainder with two exceptions tested from .05 to .3 higher in the open sample bottles. Composite milk samples should be kept closed.

Ice-cream Overrun from Raw and Pasteurized Cream.—The results of five tests produced an average overrun of 57.95 per cent., and an average score of 94.5 from pasteurized cream. The raw cream produced an average overrun of 77.39 per cent., and the score for quality averaged 89.75. The raw cream produced more "swell" or overrun, but the quality of the finished product was not so good as from the pasteurized cream.

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## DEVELOPING THE HOME MARKET FOR CANADIAN CHEESE.

H. H. Dean, Professor of Dairy Husbandry, O.A.C., Guelph.

My subject suggests two conditions: (1) That there is a Home Market for Canadian Cheese; (2) That this Market Needs Development.

The present export market conditions are very favorable for Canadian cheese, but we need to remember that these are unusual, and more or less artificial times, which are not likely to continue very long. We need to prepare for the "slump" which is sure to come sooner or later. In times of prosperity we should prepare for adversity.

Two facts stand out prominently at the present time regarding home consumption of Canadian cheese: (1) The comparatively small amount of cheese consumed, estimated at 3 lbs. per head yearly; (2) the fact that we are importing about 1½ million pounds of cheese annually, chiefly of the fancy varieties, worth nearly $300,000. There is no reason why the annual cheese consumption should not be at least 10 lbs. cheese per head of population, and no reason why nearly all the cheese at present imported may not be manufactured at home.

The food value of a pound of cheese is estimated to be equal to that of two pounds of average meat. Estimating the present meat consumption as 25 lbs. per capita (a low estimate), Canadians are consuming about 200,000,000 lbs. meat annually, at a cost of about $40,000,000. By a proper understanding of food values, we might save about $16,000,000 annually on this one item alone by substituting a part of the present meat ration for cheese. This would figure somewhat as follows: A cheese consumption of 10 lbs. per head would be about 80,000,000 lbs. This would take the place of about 160,000,000 lbs. meat, and still leave 40,000,000 lbs. meat for those who prefer corpse to cheese. The 80 million pounds of meat saved would cost about 16 million dollars. The saving, by using cheese instead of so much meat would be 16 million dollars annually. If a person were to go to the Finance Minister of Canada and tell him how to save sixteen million dollars annually for the people, such a person would be looked upon as a wizard or a fanatic and would probably get a "soft job" with the Government—or be committed to a lunatic asylum—yet the figures show these astonishing results.

### How Brought About?

But you ask how can these results be brought about? We suggest the following:—

1. Advertise the Food Value of Cheese from one end of Canada to the other until every buyer of food for human consumption knows the economic value of cheese and until the cooks know how to prepare cheese in appetizing forms, such as they do meats at present. There should be an attractive "Ad" in every paper, magazine, and periodical published in Canada. The funds may be supplied partly by Governments—Federal and Provincial, and partly by those engaged in the business—producers, manufacturers and sellers of cheese. Let a certain proportion of the funds received be set aside for advertising purposes, similar to the plan adopted by mercantile and business corporations.

One of the largest dairy machine companies in the world, recently had the following at the head of their Monthly Advertising News:

"Out of sight, out of mind;
Out of mind, you fall behind."

In these days of keen competition the dairy business must be kept in the "mind" of the public, else it will "fall behind." Merit is not sufficient to win in these times. The "mouse-trap" theory was all right for a past generation, but it is not suitable for the present. This thought is alphabetically expressed by some unknown rhymer, to whom we tender our apology:

"Oh, dear sir, in times of e e e e,
Don't fail to see the ad for Cheddar ch e e e,
Take our advice and now be y y y y,
Buy your cheese from those who advert i i i i,
You'll find the project of some u u u u,
Neglect can offer no ex q q q q;
Be wise at once—prolong your da a a a
By eating more Canadian Ch a a a."

The suggestion has been made that a campaign of advertising Canadian cheese should be undertaken by the Dominion Government, similar to that which was done for apples in the fall and winter of 1914, and which has undoubtedly been of great value to apple growers. We favor this, but, as previously suggested, think this should be supplemented by those directly interested in the business, on whom must rest the burden of *continuing* the campaign.

2. The advertising must be accompanied by practical demonstrations of the value of the goods which are advertised. No business can continue to succeed unless the goods sold give satisfaction. It is possible to fool some of the people all the time and all the people some of the time, but not all the people all the time, although some few persons have found it profitable to simply take advantage of one or both of the two first conditions, but a man or firm doing an honest business tries to give value in the goods sold, and that we must do in the cheese business.

There is a well-defined feeling that "cull" cheese are too often supplied for the home trade and that our best cheese are exported. This should be changed, and, if we must make some inferior cheese, let them be sold elsewhere—not in Canada. The story is told of a Canadian auctioneer who was selling the farm stock, implements and household effects of a man who was leaving the country. Among the household goods was a good-sized chunk of cheese. When the auctioneer came to this he announced that the cheese was of finest quality—"in fact, you can't get better." One of the idle bystanders, always found at an auction sale, remarked: "You're right. I know that. I ate some of it last week and I haint better yet!" We do not wish to advertise or sell that kind of cheese in Canada.

In order to insure a good quality of cheese sold to Canadian consumers, it would seem advisable to adopt some system of grading or branding.

THE PRESIDENT: We have no culls in Ontario.

In European countries the branding system has been of great advantage in the butter trade, of which the famous "Lur" brand, in Denmark, is the most conspicuous example. This question is now being strongly agitated among our neighbors in the United States, and is likely to be adopted by several states in the near future. Why cannot Canadians work out some plan whereby cheese and butter bearing a national or provincial brand shall be guarantee that the goods are of finest quality? As a standard, we would suggest that cheese and butter which scores 93 points and above be worthy of the national brand, and that other brands or grades be adopted for lower class goods, but not more than three grades—say a score of 90 to 92 for second grade, and below 90 third grade.

3. Finally, in order to make this plan practicable, it will require the co-operation and hearty support of farmers, manufacturers and merchants. We recognize that these are too much inclined to regard each other with more or less antagonism, but it is time to throw these prejudices to the dogs and each class work for the good of the dairy industry as a whole—in this particular case for the good of the cheese business.

The farmer or milk producer has been the great burden-bearer in the past. It has been too often considered that it is no harm to "do" the farmer, because "he don't know any better." But the farmer is waking up, and we may as well recognize the fact that if milk nets the farmer less than one dollar per 100 lbs. for cheesemaking, he is going out of the business. If the farmer stops producing milk where will the cheese manufacturers and merchants land in a short time? On the other hand it is true in a number of instances that men have put their *all* into a cheese factory, but when an opportunity came for the farmer to make more money out of his milk by sending it elsewhere, the patrons have left the manufacturer in

the lurch. This was unfair to the man who trusted the farmers to patronize his business. Yet, who can blame the farmer for trying to get all he can for his milk? as the margin of profit in any case is a very narrow one.

As regards the cheese merchant, everybody is ready to "do" him a good turn, if only he will increase the price paid for cheese. Competition is keen for the trade, and it is claimed that there is no money to be made in handling cheese. However, one of the trade journals, supposedly in favor of buyers' interests, recently said, facetiously: "As regards the results of the season's business, some of our dealers and exporters inform us they have made no fortunes, having managed, through foolish competition among themselves, to line the pockets of the farmers at the expense of their own interests. This may be true to some extent; but, as a rule, the whole bunch of our dealers and exporters are found as fresh and ready as ever at the commencement of a new season to engage in the exhilarating competition, for the benefit of the Canadian farmer. We question if a more noble example of trading for the good of others can be found outside of the export cheese trade of Canada."

We wish, in conclusion, to emphasize this point—the Canadian farmer having tasted the sweets of high prices for cheese during the latter part of the season of 1914, cannot be induced to accept low prices with good grace in the future, hence strenuous efforts should be made to maintain the present high level of cheese prices. One of the means to accomplish this is to develop the home market by advertising the great food value of cheese to Canadian consumers, and by supplying none but first-class cheese in as many varieties and styles as the consuming public demands, although the staple cheese will always be the Canadian Cheddar, than which no better cheese is made. For the price paid, no other concentrated food is so cheap and so nutritious. Let everbody eat more cheese during 1915, and thus reduce the high cost of living.

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## DISCUSSION.

(Led by G. G. Publow, Kingston, Chief Dairy Inspector and Sanitary Inspector for Eastern Ontario, Kingston.)

After expressing pleasure in meeting with the dairymen of Western Ontario again, Mr. Publow complimented the directors upon the splendid attendance and the excellence of the exhibits.

I do not think we have anything new to offer in connection with our work in dairying. It is not by putting new things before the people that we expect to make progress. The problem we have in the East, and judging from the excellent report of your Chief Instructor, Mr. Herns, the problem you have to meet in the West, is that of getting all the people engaged in the work to do as well as the best, and that applies both to cheese factories and creameries. If you can solve that problem for us in the East, we would appreciate it very much. We have our own ideas regarding it, and we are trying to place them before the people as strongly as we can.

In connection with improving our cream and butter, we are suggesting to the creamery men that some form of cream grading should be inaugurated. We believe there is no better method of improving our butter than by improving the quality of the cream as delivered to the creameries. The buttermakers, as far as we

can see, are doing as well as they can with what they receive. The same thing applies to the cheese factories. What are we going to do to get all the patrons to practise the methods of those who are supplying the best milk? Can we inaugurate any form of grading the milk that will stimulate them? The Government does not hesitate to help you to weed out the poor cows. If we could get some method of applying a test to the different dairymen to weed out their methods and get them to adopt the methods of the men who are supplying the best milk, it would be a great thing for the dairy industry of Ontario. We want all to continue in the production of milk and cream, but we want the indifferent ones to change their methods and adopt the methods of the men who are doing good work. (Applause.) At our district meetings in Eastern Ontario this year we made that one of our special topics, and we are looking for good results therefrom. We are not content with that alone; and the factorymen are arranging for special meetings, when a few factories in a district will arrange to hold one central meeting to have this matter taken up and discussed, and we hope to be able to accomplish something in this way. We have suggested that the factorymen should pass a resolution to the effect that the cheesemakers refuse to accept milk over a certain temperature at the factories. We find that probably half of the patrons are sending milk in a suitable condition, even at the worst seasons of the year. The cheesemakers know the difference in handling milk in cool weather and in warm weather; they also know that during all conditions of weather many of the patrons deliver milk equally good, and what one can do another can do if he will only try. You are all partners in this work, and why should you not all try to equal the best? I think this is the source from which we may expect to make the greatest improvement in butter and cheese. We do not need to ask the people to do anything better than the best of them are doing to-day, but if we could get them *all* to equal the best, we would be in a happy position; we would be able to produce a better product and would receive better prices. The good prices which we are receiving to-day ought to encourage you.

The point brought out in the paper written by Professor Dean as to the advertising of Canadian cheese is deserving of special attention. What food product are we producing in Canada to-day that is receiving as little attention in the way of advertising as the dairy products of this country, and yet we look upon dairying as the greatest branch of agriculture in the country. To give you an idea of how much people know about Canada Cheddar Cheese, I would like to tell you something that happened at Ottawa. This year at the Ottawa exhibition I was chairman of the committee on dairy products; we were able through Mr. Putnam, at Toronto, to cut up some cheese to distribute to the visitors. We secured as good cheese as we possibly could, and we placarded it not only on the plates but on the wall, "The value of Canadian Cheddar Cheese as a food as compared with Meat." Would you believe that there was not one person in a thousand sampled this cheese who did not inquire where they could get Canadian Cheddar Cheese. The word "Cheddar" seemed to mystify them. The exhibition cheese were sold to the merchants on the condition that they pay us one-quarter of a cent. per lb. above the market price and that they exhibit the cheese in the store and placard them as the finest Canadian Cheddar Cheese. I believe the time has come when a special effort should be put forth in this country to advertise the value of Canadian Cheddar Cheese as a food. I think that matter should be taken up at our fall fairs. There has not been sufficient attention given to provide suitable conditions for exhibiting cheese and butter at fall fairs. At most of these fairs, the butter and cheese exhibits leave a great deal to be desired. They are not put up in an attractive way

so that the people will admire them. I think this matter of advertising should not be left to the manufacturer only; I think they are doing a very great deal. The men who should be most concerned are the producers of the foodstuffs in this country, and they should see to it that these things are done in their interest and they should use their influence in the matter. We have endeavored to get the factorymen in the East to carry cheese over so that the makers can exhibit them. You may have noticed the small exhibit at Toronto Exhibition that came from Eastern Ontario, and many reasons have been given for it. The makers are anxious to exhibit, but, when it comes to carrying the cheese, they do not feel that they are able to do so, and I think the factorymen should lend their assistance and encourage the makers to exhibit, because it is entirely in their best interest as producers of dairy products.

I think it would be out of place for me to say anything regarding the manufacture of cheese and butter after having seen this splendid exhibit, and knowing the reputation the makers in this Western section have. I wish to say, however, that there is one point in connection with the manufacture of cheese to which I think we should give special attention, in order to insure the finest quality and to enable the farmer to get the most out of the milk: set the milk in good time. I know in the East our makers have been drifting away from this method. Knowing the value of a culture in overcoming certain defects, particularly of openness of make and defective flavor, many of them have gone too far in the way of ripening the milk before setting. In the past year, we tried, as far as possible, to point that out to our makers and get them to set the milk sweeter, but it seems difficult to persuade them to do so. I believe many cheese are injured by this method, and the quantity of milk required to make a pound of cheese is increased as a result of the over-ripeness of the milk. All of the blame cannot be placed on the farmers of this country in this respect, as the makers are over-ripening the milk. I know this to be true in the East, whether it is true in the West or not I do not know, and I appeal to the makers in that behalf.

I ask you not to be discouraged in the manufacture of cheese in this country. I believe the prospects never were better for dairying and for the manufacture of cheese, and I believe that, as cheesemakers, we should continue to put forth our best efforts to make the best cheese that can be made, and we should not be satisfied unless we continue to be leaders in this work.

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## ADDRESS.

Geo. A. Putnam, Director of Dairy Instruction in Ontario, Toronto.

I am always pleased to meet with the dairymen, and I recognize that in the dairy farmers of Ontario we have a class that are engaged in an activity of Ontario agriculture which is as certain and as sure, and possibly more certain and sure, than any other branch of Ontario agriculture. I do not know that the dairymen make as big profits as some of the fruit men or beef men in certain years, but if you take a series of years, I think you will find the dairymen have great reason to be thankful for the substantial, dependable nature of their industry.

I must congratulate you on the splendid convention you have and upon the exhibit of dairy products. I consider the exhibit a very important feature in connection with your Association work, and I only wish that the Dairymen's Associa-

tion and the producers as well as the makers, and the Government—if you could induce the Government to do so—would take up this matter of advertising Canadian cheese among our own people. I would like to enlarge upon what Mr. Publow said with regard to the distribution of samples of good cheese at the Ottawa Fair. That good cheese to which he referred was secured from Western Ontario. We gave samples of similar cheese to thousands of people (from city, town and country) at the Exhibition in Toronto, and many inquired as to where they could get that kind of cheese. "If we could go to our grocer and get as good cheese as that," they said, "we would buy it in much larger quantities." Cheese should be used to a much larger extent by Canadians, and would be if they always got well ripened cheese of superior flavor. Possibly some of you may feel dissatisfied, and think we are not progressing along dairy lines, but, the nearer you get to perfection, the harder it is to make outstanding progress: so that we must keep pounding away harder than ever. We may not be able to make progress which will be so marked as the progress of eight or ten years ago. Nevertheless, we are gradually establishing a greater uniformity and better quality, and I must agree with our presiding officer, who now says that we have no culls or very few culls in Ontario.

It is discouraging to note the lack of response to agricultural betterment on the part of a large percentage of the farmers in some sections of Ontario, but still a great many of these farmers who do not attend Farmers' Institute meetings, Dairy meetings, Short Courses, Dairy Conventions, etc., are getting more or less benefit out of the meetings, because they see what other men are doing as a result of these meetings and they try to emulate them. We believe that the farmers of Ontario will respond to a greater extent during the coming season as a result of the appeal which is being made for a greater and better production. We do not want a greater number of acres, necessarily, but a better cultivation of the land already broken up, and in that way we could increase the production per acre rather than increase the acres and possibly reduce the production per acre. I know that we can depend on our hard-headed, practical, experienced Canadian farmers to respond to the appeal which is made for the support of the Empire in their fight for freedom and liberty, through a greater production.

When Mr. Publow was appealing to the makers to fix up their factories, it occurred to me that if each maker could go away from his factory for a day or two and just lose himself, and then come back in this frame of mind, "Now, I have never seen this factory before; I do not know what the surroundings are. I am going to approach the factory as an outsider and see what my judgment of the whole equipment is," I believe many of them would get the hammer and saw, the axe, the scoop shovel and the spade and see that their factory was put in better shape. There is room to make vast improvement in 50 per cent. of the factories by a couple of days of honest effort by one or two earnest men. I appeal to you to make the experiment.

The speaker here referred to his efforts with the Workmen's Compensation Board to have desirable regulations introduced so far as the factories and creameries are concerned. Only those manufactories employing six or more workmen in the actual manufacturing operations will be compelled to come under the Act. All may take advantage of the Act if they so desire and make application to the Board.

I feel confident that this Act will be a splendid thing for the workmen of the Province. It is claimed that the Workmen's Compensation Act in force in Germany has been a large factor towards industrial efficiency in that country. I am

sure it will be a very forceful factor in improving industrial conditions in Ontario when it is properly adjusted.

Just a few words in reference to the improvement of conditions surrounding home and community life. We believe all farmers are anxious to see the community in which they reside provided with those advantages which mean real and permanent advancement. Cheesemakers, from the very nature of the work in which they are engaged, come in contact with the men of the community and have an opportunity to exercise an influence for the securing of those things which mean so much to the betterment of rural conditions.

We are hearing a great deal these days about the necessity for stemming the tide cityward and keeping the people on the land, and to draw to the land the people who are in the city and who should be in the country. Some have gone so far as to say that they would like to see all of those who are out of employment in the cities brought to the country districts. I do not believe the farmers of this Province want inefficient and inexperienced men from the city. They desire only the men who have had some experience and who are able to take some responsibility.

The dairymen of this Province have or should have money, and it takes money to provide community advantages and opportunities. I think I am right in saying that the dairymen generally are willing to contribute their share as readily as any other class in the community. You have had the helpful experience of co-operation in your dairy work, and co-operation is necessary in most efforts if progress of a community nature is going to be made. There are 101 things which are needed in our rural communities, and some of these things have been secured through the efforts of one organization, which, I believe, has within it greater power of improvement in rural conditions and educational advantages than any other; I refer to the Women's Institutes.

Dr. C. C. James made an appeal to the Women's Institutes this year. He said: "We have appealed to the farmers to do certain things to improve our rural schools, and we believe that you women have it within your organization to create that sentiment which is so necessary before these things are going to be realized." I do hope that we will find better schools in our rural districts, schools in which agriculture will be taught. The District Representatives are to a greater or lesser degree reaching the boys and the girls in the rural districts through the School Fairs and through their short courses in agriculture, but they are only touching a very small percentage as yet. In connection with several of these short courses this winter, I have sent a lady demonstrator to give a course in Domestic Science covering a period of four weeks. Why should we offer these things to the boys of the land and not offer anything to the girls? We have made a beginning, and I am sure it will grow and extend. We have done something through our Women's Institutes in the way of demonstration lectures, in Home Nursing, and in Sewing and in Food Values and Cooking, and they were very much appreciated. Last year we reached nearly 1,800 women and girls, but this year we will not reach quite so many, because the women of the country are so deeply interested in working for the needy Belgians and in making socks and Balaclava caps and various articles required for the soldiers and for the Red Cross work, that I cannot and do not wish to persuade them to do much along educational lines. I got word just the other day from one Institute which had responded to a call for a hospital established by the Red Cross Society. When the appeal was made, the Institute sent in enough pillows to equip 1,040 beds in one of the Field Hospitals, and, besides that, they sent in enough pillows to fill a space 20 x 12 x 12, and these have

all since been used up, and we have sent out another appeal and more pillows are coming in. One Institute sent in $3,000 worth of clothing and food for the Belgian Relief. The women of the Institute did not furnish all this, but they got it from the farmers in the immediate locality. Another Institute that we looked upon as being rather weak and backward, sent to the Belgian Relief Fund, the other day, $300 in cash, so they are responding from all over the country, to such an extent that it would almost appear as if the Women's Institutes were established just for such an emergency as we have at the present time. I do not know how else we could have reached many of the 810 communities represented by our organization except through the Women's Institute.

You, as cheesemakers, should use your influence in introducing good literature in the community. You can get through the Department of Education a travelling library, a selection of forty or fifty books in a case. These can be secured for the asking. Write Department of Education, Parliament Buildings, Toronto. The cheesemakers would do well to assist in the establishment of a local organization for the discussion of the farmers' problems among themselves every two weeks throughout the winter. I am convinced that if the Farmers' Institutes had been established upon the same basis that has been followed in the Women's Institutes, it would have been a much more forceful organization than it is at the present time.

The speaker outlined some of the work being done by the Women's Institutes. Those who are interested may secure literature bearing upon Women's Institute work by applying to Institutes Branch, Department of Agriculture, Toronto.

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## GRADING AT CREAMERIES—ITS VALUE AND NECESSITY, AND HOW IT WORKS OUT IN PRACTICE.

Prof. J. W. Mitchell, Winnipeg, Man.

As my subject, that of the value, necessity and practicability of the grading system, in connection with creamery work, has been selected for me by your Secretary, it is a fair assumption that it is one in which you are more or less interested —as interested, I hope, as its importance warrants.

To what extent is our experience of value to you, or yours to us? This depends upon the extent to which we have like conditions and like problems to solve. It would seem wise, then, to briefly clear the way for what I have to say.

Two Provinces may be quite a distance from each other, so far as longitude is concerned, but very close to each other from a dairy standpoint. Ontario has advanced from home, or farm dairying, to factory or co-operative dairying, and Manitoba is endeavoring to travel the same road. Both are anxious to turn out as good a commodity as possible, and in their efforts are facing similar difficulties.

Again—and this is a point I wish to emphasize—the creameries in Ontario and Manitoba are operated under much the same conditions, that is, in neither Province are they, nor have they been, either Government owned or operated. Hence the introduction of anything of the nature of grading should be as practicable with you as with us.

A third point. We all firmly believe in co-operative dairying, as it has so many points to recommend it; but, whatever its form, and wherever it is practised, it always presents the one great problem for solution, and that is, *how to*

*obtain, not part but all, the raw material of uniformly high quality.* There is no other phase of co-operative dairying where this problem looms up larger than it does under the cream-gathering creamery system. The reasons are so obvious that we need not pause to dwell upon them.

Enough has been said, I hope, to indicate that our conditions and our problems are so nearly the same, that your experiences are of value to Manitoba, and Manitoba's to you.

The West is going in for mixed farming fairly rapidly. For instance, Manitoba's output of creamery butter for 1912 was 2,931,000 pounds, while that for 1914 was 4,761,000 pounds, an increase of 62 per cent. in two years.

On the basis of our present output of creamery butter, an improvement in quality that would increase the value of our butter 2 cents per pound would mean an increase in the annual revenue of our creamery patrons of nearly $100,000.00. Figure for yourselves what a similar improvement in the quality of Ontario butter would mean. How is this improvement to be brought about?

I have had the privilege of being associated with creamery work in Ontario, the Maritime Provinces, and two of the Prairie Provinces, and I repeat, unhesitatingly, that the big problem for all is, *how to improve the quality of the cream supplied to the creameries.* All who have given the subject any thought will agree with me, I think, that it is a much more difficult task to get the 100 or more patrons of a creamery to all supply cream of good quality than it is to get or, if necessary, make the conditions somewhat as they should be at the creamery.

We are simply stating an axiom, or self-evident proposition, when we say that whatever is right cannot be wrong. The principle of cream grading falls into this class, but, as with many another, it has been difficult to bring about its adoption.

We all know that cream that is sweet and clean in flavor will make a butter superior in quality to, and worth more money than, butter made from cream that is overripe or off in flavor. Hence there is just as much reason for grading cream, and paying for it on the basis of quality, as there is for grading wheat, beef cattle, and dairy products themselves, as they come on to the market.

Grading cream and making a difference in the price per pound for the fat, according to quality, is just. The old non-grading system encourages the careless patron in his carelessness, and tends to discourage the careful patron in his efforts. Justice to the patron who supplies good cream to our creameries, and justice to our creamery industry, both call for the application of the grading system. There is no other one step that will begin to equal this, in the way of encouraging the good patron to do better work, stimulating the careless patron to improve his methods, and building up the quality and reputation of our creamery butter.

We worked hard for years, in the way of instruction work, holding meetings, issuing dairy literature, and meeting patrons personally, in as large a measure as possible; and while we accomplished as much good, through these means, as you would expect, yet the persistently careless patron remained careless, and we had to face such remarks as that of one good creamery patron, who said: "In practice our creamery virtually says, 'All coons look alike to me.'"

Creamery Convention.—We succeeded, some few years ago, in getting a few of our creameries to make a trial of the grading system, from which they admitted that good results followed; but we were unable to introduce the grading system, in a general way, until last year.

In February, 1914, a Creamery Convention was held at the Manitoba Agricultural College, the Department of Agriculture defraying the cost of transportation of one delegate from each creamery. Practically all the creameries of the Pro-

vince were represented, and I consider that the work of this Convention formed a landmark in the development of the creamery industry of the Province. After thorough discussion and consideration two important resolutions were passed unanimously.

The first reads as follows:—

"Resolved, that the creameries of the Province should institute a uniform system of grading cream, and that payment to patrons should be made on the basis of the same."

The following, as a basis for grading the cream, was subsequently approved of by resolution:—

"*First Grade Cream*: Preferably sweet, from which first class butter can be made by a competent buttermaker. The flavor to be clean and fresh, and the consistency smooth and even."

"*Second Grade Cream*: Sour or sweet, which is slightly stale, old or bitter, or otherwise slightly defective in flavor, but of a smooth, even consistency."

"Cream which will make an inferior quality of butter should be rejected."

"A difference of two cents per pound of butter-fat, between the prices paid for the two grades of cream, should be made."

Here is the second of the two resolutions passed:

"Resolved that the Government be most respectfully and urgently requested to make arrangements for the grading of our creamery butter, and furnish the necessary facilities, including cold storage, for carrying out the same."

In principle, both of these resolutions became effective at the beginning of the creamery season, the Government, on its part, increasing the instruction work amongst the creameries and appointing a Dairy Produce Grader.

Introduction of the Cream-Grading.—I confess that I experienced a little anxiety as to how cream-grading would work out with us in practice. I had no doubt as to the justice of the system, but the doubt consisted in whether the creameries would stand by each other or not. In the two Provinces to the west of us, the creameries either are, or have been, under Government control and operation for years, while in Manitoba the conditions are, as I have already intimated, similar to what they are in Ontario.

*However, cream grading was very generally introduced and carried out in good faith, and without any appreciable friction between either the creameries themselves, or the creameries and their patrons.*

Instruction Work and the Grading of Butter.—I was fortunate in having under me a staff which worked loyally and in unison. The instructors did heroic work amongst the creameries—by the way, one of them, Mr. Crowe, is with us to-day—and the produce grader did his work efficiently and conscientiously.

Generally speaking, in grading the butter, the grade was not marked on the packages, the work being done for the two-fold purpose of reporting back to the creameries upon the quality of the butter, and keeping posted ourselves as to what each creamery was doing. Where butter was shipped out of the Province in carload lots, say to British Columbia, a certificate as to grade usually accompanied it, upon request from the shipper.

To facilitate the work of reporting shipments to the produce grader, all creameries were supplied with suitable forms and addressed envelopes for the purpose. This is a copy of the report form:

MANITOBA DEPARTMENT OF AGRICULTURE.

(Dairy Branch).

REPORT OF DAIRY PRODUCE GRADER.

Creamery .....
Date of Shipment .....
To whom Shipped .....
How Shipped—by Freight or Express .....

Description of Packages.

No. of boxes of prints ..... Net weight..... Lbs.
" 14 lb. boxes..... " ..... "
" 28 " ..... " ..... "
" 56 " ..... " ..... "

Total.....

Churning Numbers .....
Date.....Signed .....
P.O.....

NOTE.—Report should be filled out and forwarded by first mail.

A simple method of marking packages, for the purpose of assisting the grader in his work was adopted. For instance, the fourth churning for the month of January, the first month of the year, would be marked 1/4; the tenth churning for the month of February, the second month of the year, would be marked 2/10, etc.

For reporting back to the creameries upon the quality of the butter, a similarly simple report form was used. Here is a copy of it.

MANITOBA DEPARTMENT OF AGRICULTURE.

(Dairy Branch).

REPORT OF DAIRY PRODUCE GRADER.

on

Butter shipped from .....Creamery
to.....

SCORE.

| — | Perfection Score. (Points). | Score obtained. | | | | |
|---|---|---|---|---|---|---|
| Flavor | 45 | | | | | |
| Grain and Body | 25 | | | | | |
| Color | 15 | | | | | |
| Salt | 10 | | | | | |
| Finish | 5 | | | | | |
| Total | 100 | | | | | |
| Grade | | | | | | |
| Churning Nos | | | | | | |

Minimum for First Grade—Flavor 40. Total Score 91.
" " Second " " 37. " 85.

Remarks:

Date.....191..  Signed.....
Dairy Produce Grader.

This report was made out in triplicate, one copy being sent to the creamery, one being retained by the grader, and one coming to my office.

Results of the Introduction of the Grading System.—The beneficial results of the introduction of the grading system were most marked, and its continuation will mean a steady improvement in the quality of Manitoba Creamery butter, from year to year, and the placing of the creamery business on an ever higher plane. There is little doubt but that the improvement in the quality of our butter, due to the introduction of the grading system, coupled with thorough instruction work amongst the creameries, prevented a slump in prices during the season of 1914. The price of June creamery, for instance, did not fall to within four cents of what the produce merchants had anticipated they would be able to buy it for. I have no fear that we shall, after last year's experience, ever fall back to the old order of things. Furthermore, I feel that it is no exaggeration to say that our system of grading both the cream and the butter doubled the efficiency of the work done by the instructors. They were able to keep themselves posted at all times, as to what each creamery was doing, and consequently could first visit the creameries where their services were most urgently needed. Again, in visiting a creamery, they did so with some previous knowledge of the defeat requiring to be remedied.

Was all of our butter of No. 1 quality? No, it was not, nor is this the case in any of the provinces.

Did all of the creameries grade equally close? No, they did not. Let me show you a chart throwing light upon this point, and which is self-explanatory:

Effects of Grading on Quality of Butter.

| Creamery No. | First Grade Butter, %. | Care in Grading. |
|---|---|---|
| 1 | 94 | Good. |
| 2 | 86 | Very Fair |
| 3 | 66 | Indifferent. |

Note.—(1) No. 2 Creamery made such poor butter during 1913 that it was difficult for it to find a market for its butter at the beginning of the season of 1914.

I would say this, however, that cream grading became practically universal, and was carried out conscientiously, and the results were most gratifying. *Furthermore, it proved entirely practical.*

I am satisfied that you will introduce the cream grading system and hope that you may find it practicable to adopt some system of grading the butter, since it is of so great value to both the creameries and the instructors. I think that I know Ontario conditions fairly well, having had experience of them for several years, and I see no reason why you cannot successfully introduce the grading system, as we have done, with possible variations to meet your conditions.

Mr. Barr judged the dairy products at the Canadian Industrial Exhibition, Winnipeg, in July last, and he expressed himself as agreeably impressed with the uniformly high quality of the large exhibit of creamery butter—most of the butter scoring within the narrow limits of 96 to 98 points.

Just one more point, in concluding my remarks. Frequently we find, at our meetings, two extremes; those who go back home so enthused that they are going to revolutionize things in a week, or at most, a month, and those who are so

sceptical as to all innovations, that they think it impossible to make any change that spells improvement. I don't like either extreme, but I do like the genuine optimist, who has faith in the future, and the perseverance that ensures a realization of his hopes.

If grading at creameries is to be made the success that it should be it must receive the whole-hearted support of the produce merchants, that is, it is incumbent upon them to make the distinction that should be made between first grade butter and the lower grades. Good butter is worth more and will retail for a higher price than butter of inferior quality. Hence the produce merchants should pay as high a price as possible for butter of first quality and lower prices for the lower grades. It will greatly militate against the successful introduction and working out of the grading system unless this is done.

Let me quote a few lines that very well sum up my thoughts in this connection:

We have not wings, we cannot soar;
But we have feet to scale and climb
By slow degrees, by more and more,
The cloudy summits of our time.

The mighty pyramids of stone
That wedge-like cleave the desert airs,
When nearer seen, and better known,
Are but gigantic flights of stairs.

The distant mountains that uprear
Their solid bastions to the skies,
Are crossed by pathways that appear
As we to higher levels rise.

As far as I am concerned, I have given you as briefly as possible an outline of the work as we have carried it out in the Province of Manitoba, and I would repeat that I do not think there is any danger of our ever going back to the old condition of affairs and I would heartily recommend that you introduce the grading system both at your creameries and your factories. (Applause.)

MR. FRANK HERNS: I am sure we have been very much pleased with the address Prof. Mitchell has given us on this very important subject of cream grading. I think it is one of the main things that we will have to think about for some little time. When I heard of the good work he was doing in Manitoba, I felt we should try to get him to come down and tell us what he had been doing there, and I am sure he has told you in a way that every person can understand and appreciate. I think here in Western Ontario particularly, we should try to work out some scheme which will give us the improvement which we are looking for so much. I do not know that we are just yet prepared to outline any special scheme, but each year we are getting closer to some scheme, and some creameries have already adopted a plan of cream grading.

Getting the butter graded by the produce men is a point that has been troubling me for some time, and we must find out where we are at from that standpoint first, and then we can work along from the other lines. I want to thank Mr. Mitchell for coming all the way down here and giving us this most excellent address. (Applause.)

MR. ALEXANDER: We understood you to say that the difference in price between butter from No. 1 and No. 2 grading is 2c. per pound.

PROF. MITCHELL: That is the difference we made.

Q.—In your No. 1 creamery showing 91 per cent. of first grade butter, does that leave only 6 per cent. of second grade butter from that creamery?

A.—Yes, only 6 per cent. of second grade butter.

Q.—How is the cream gathered—in separate cans or all put in the one can?

A.—Largely delivered in individual cans.

Q.—How would you grade the cream if the gatherer dumped it all in one can?

A.—The only plan you can adopt in a case of that kind is to take a sample in clean bottles; have a bottle for each patron and keep them in boxes where they will be reasonably cold, and then do the grading at the factory.

Q.—No. 1 and No. 2 cream would go into the same vat and be all made into the same butter?

A.—Creameries where they get the cream in that way consider that even where it is not separated and put into separate vats, that the higher percentage of first grade cream that is put into that vat raises the standard of the butter and that the cream should be paid for in that way, but we recommend having the cream sent in in individual cans. That is the very best way.

Mr. McFeeters: No. 1 creamery turned out 94 per cent. No. 1 butter. Can you give us the percentage of cream that was graded No. 1 and No. 2 out of which that butter was made?

A.—I could not give you the exact percentage, but it was practically all first grade cream that was taken in at that creamery.

Q.—Having graded in that way, would not it be better to make separate churnings?

A.—Yes, it would be better; it would be the better way if you could get enough of each grade of cream.

Q.—If you were pasteurizing the cream, would you pasteurize the No. 1 or the No. 2?

A.—I would like to pasteurize both; we have some problems to work out on the pasteurizing of cream. A number of our creameries get very good results from pasteurizing in this way. Where the cream is inclined to be ripe, they heat it to about 120 or 125 degrees, cool it down and churn immediately. I do not know whether you would call that pasteurizing or not.

Q.—How long would they leave it at 125 degrees?

A.—Just a very few minutes. It certainly seemed to improve the quality of the butter very materially. The heating drove off a good many odors in the cream. I would like for my own information to know whether any of you have tried these low temperatures. It is being done to quite an extent in the Province of Manitoba, and it improves the quality of the cream. I asked our bacteriologist to examine into the matter and see whether it resulted in pasteurizing. One hundred and forty to one hundred and fifty degrees is as high as we have been going and I would like to know what you have been doing down here.

Mr. McFeeters: For sometime we have been adopting the plan of raising the temperature for a given time. We were adopting a temperature of 160 to 165, and the results were not to our liking. These points were discussed at creamery meetings in December and it was stated that 165 to 170 was about right for a short time and 140 where the heat was kept up for 20 minutes. That persuaded me that we were adopting a rather high temperature in view of the fact that we were maintaining it for from 20 minutes to half an hour, and so we reduced the temperature to about 140, and we like the results much better than with the higher temperature.

Prof. Mitchell: I do not know whether 120 and 125 is a pasteurizing temperature or not, but it certainly improves the quality of the cream, but we found it was not advisable where we heated it to that low temperature, to hold

the cream over from one day to another. We cool down and churn immediately. You will find the buttermilk much better by using the lower temperature. There is a higher loss in the buttermilk if you pasteurize the cream at a higher temperature.

Mr. Crow: At Verdun, Manitoba, they pasteurize at a temperature of 146 degrees, and they leave the vats open.

The Chairman: What difference in price do you get for second grade butter?

Prof. Mitchell: There is a difference of from 2c. to 3c.

Q.—Did the second grade butter run fairly uniform?

A.—Yes, fairly so.

Q.—If you had very much second grade cream, would the butter be so bad that you would lose on it?

A.—Of course, the more second grade cream, the worse your butter would be. One of the big factors with the grading system is that you get a larger percentage of first grade cream because the farmers are looking for the larger prices.

Prof. Mitchell: We are very fortunate in the city of Winnipeg, because the consumers are desirous of obtaining first quality butter, and they are willing to pay the price for it, and that makes it all the easier for the produce merchants to make a difference in the price.

Q.—Have you any fat standard for the first grade cream?

A.—We did not introduce a fat standard; possibly the reason we did not is because our fat test will run from 30 to 35 per cent. and that was not a difficulty that we had to contend with. The fat test being high enough, we did not make any difference on account of the percentage of fat in the cream, although we strongly recommend to our patrons that they send cream testing in the neighborhood of 35 per cent. and not below 30.

Q.—You would accept 20 per cent. cream in the first grade?

A.—We have never had any trouble with 20 per cent. cream.

The Chairman: I now have the very pleasant duty to perform of introducing to you the new President of the Association, my good friend, Mr. Robert Myrick, of Springford. He is an old cheesemaker and an up-to-date proprietor of a cheese and butter factory.

Mr. Robert Myrick, President-elect: I have only to say that I thank you very much for the honor you have conferred upon me by electing me to the position of President of this very important Association. I do not think I will be able to come up to my worthy predecessor, but I will try to do my best. As our time is about up, I will not occupy your time. We will now have the report of the Resolutions Committee.

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## REPORT OF COMMITTEE ON RESOLUTIONS, 1915.

We have pleasure in submitting the following resolutions:

1. We, the members of this Association desire to express our appreciation of the kindness of the Mayor, Council and Board of Trade of the City of St. Thomas in furnishing the free use of the Engineer's Hall for the Convention, and the Library Building for the Dairy Exhibition, and we also wish to thank the citizens of St. Thomas for the kind reception they have given us.

2. Whereas, the excellent addresses given by the various speakers have made this Convention not only successful but of much educational value, we desire

to express our appreciation of their efforts and extend to them our sincere thanks for their assistance.

3. The thanks of the members of this Association are extended to the press of St. Thomas and other cities and towns for the excellent reports published by them of this Convention.

4. That the thanks of the members of this Association are extended and hereby tendered to the Canadian Salt Co., of Windsor, Ontario, through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the company to this Association.

5. That the thanks of this Association are hereby tendered to C. Richardson & Co., St. Mary's; R. M. Ballantyne, Ltd., Stratford; C. H. Slawson & Co., Ingersoll; The Heller Mertz Co., New York; The J. B. Ford Co., Wyandotte, Mich.; The Candian Salt Co., Windsor; The Western Salt Co., Courtright; Ryrie Bros., Toronto; The Imperial Bank of Canada; De Laval Dairy Supply Co., Montreal; W. A. Drummond & Co., Toronto; Wells-Richardson Co., Montreal; The Dominion Chemical Co., Syracuse; for the special prizes kindly donated for our Dairy Exhibition.

6. That as dairymen we are under great obligations to both the Ontario Department of Agriculture and the Federal Department of Agriculture, for assistance rendered the dairy industry, and we wish to express our sincere thanks and appreciation of the work done by these Agricultural Departments.

Moved by MR. JOHN BRODIE, seconded by Past-President J. B. MUIR, that the resolutions as read be adopted. Carried.

## MEETING OF CHEESEMAKERS AND BUTTERMAKERS HELD AT GUELPH DAIRY SCHOOL.

Following is the report of the Annual Cheese and Creamery Meeting, held at the Dairy School, Agricultural College, Guelph, Wednesday, December 9th, 1914, under the direction of the Dairy Branch of the Ontario Department of Agriculture and the Dairymen's Association of Western Ontario.

Chairman, Mr. J. B. Muir, President of the Dairy Association of Western Ontario:

The following subjects have been announced for consideration, and well known dairymen will lead in the discussion of each. We will hear from our Chief Instructor, Mr. Frank Herns first.

1. A brief summary of experiments in:
   (*a*) Buttermaking.
   (*b*) Milk and Cream Testing.
   (*c*) Cheesemaking.
   (*d*) Cottage and Buttermilk Cheesemaking.
2. Variations in daily test of patron's cream.
3. Testing samples of milk and cream sent in from farms.
4. Cream sampling by the hauler.
5. The best temperature at which to pasteurize cream.
6. Suggestions for improving quality of cheese and butter.
7. The milk sediment test for cheese factory milk.
8. Cream cooling experiments.
9. Visiting creamery patrons.
10. (*a*) Importance of the ice crop.
    (*b*) Cost of putting up ice.

This is the first time I have had the privilege of occupying the chair at this very important meeting, and I am very pleased indeed to see so many present. I do not wish to occupy your time with any lengthy remarks as we shall require all our time for discussion. We trust you will take up the subjects as they come up, discuss them freely and not hesitate to bring up any interesting points which may be of interest.

Mr. Herns: Owing to the somewhat depressing conditions brought about through the strenuous times under which we are laboring, I was very much inclined at one time, to pass over this meeting this year, thinking that perhaps you might not care to meet in any great numbers at this time. However, after thinking over the matter and consulting with others, I finally decided to go ahead with the gathering, believing that "Business as Usual" should be our watchword, even under the trying situation with which we are now faced. Judging from the attendance this afternoon there is no question about the interest taken in this meeting, and we have every reason to believe that it is probably one of the best meetings of the kind held each year in Western Ontario. We have the advantage of reduced railway rates, and the privilege of visiting the Winter Fair by holding the meeting at this time. It is becoming each year a more difficult problem to arrange a programme that will meet with your approval and hold your interest. Our desire, however, is to have subjects discussed which are of special importance in your work. The times will undoubtedly bring up new problems and we must devise ways and means of meeting these problems in the best way and to the advantage of all concerned. Each year brings us something new for discussion and our desire is to arrange the programme entirely for

your benefit and for the benefit of the industry by bringing out features of interest and importance. We have to thank Prof. Dean and his staff for the trouble they go to each year in assisting to make this meeting a success. We have also to thank all those who take part in the discussion, and more particularly those who take the trouble to prepare opening remarks on the different subjects which appear on the programme. I will briefly open the discussion on each subject, pointing out as briefly as possible the object in discussing these points and would ask you to be perfectly free in expressing your opinions or in asking questions. It is through a free interchange of ideas and our views on different subjects that we are able to benefit each other. It is your viewpoint we wish to get and in this way plan our instruction work to meet your special requirements.

## A SUMMARY OF EXPERIMENTS IN BUTTERMAKING.

R. W. Brown, O.A.C., Guelph.

A comparison of Buttermilk yields from churnings of various sizes and of cream containing various percentages of fat.

To determine the pounds of buttermilk to be obtained per ton of butter, forty-four churnings were made. After the churnings were completed enough time elapsed to drain the butter fairly dry.

No wash water was added to the buttermilk.

The largest churning made contained 1,514 lbs. cream.

The smallest churning made contained 160 lbs. cream.

The average churning was 351 lbs. cream.

The average per cent. fat in cream was 33.3 lbs. cream.

The per cent. fat in the cream varied from 28 to 41.5.

The average pounds of buttermilk per pound of butter was 1.47. For each ton of butter made there were obtained an average of 2,940 lbs., or practically, 3,000 lbs.

When the percentage of fat in the cream was 28, the amount of buttermilk obtained per ton of butter was 4,226 lbs., while that obtained when the cream tested 41.5 per cent. fat was 2,176 lbs. buttermilk per ton of butter. For each one per cent. increase of fat in the cream above 28, there were 152 lbs. less buttermilk per ton of butter.

Mr. Robertson: What does the poultry department estimate the value of buttermilk at?

Prof. Dean: Fifteen cents per cwt.

Mr. McFeeters: Twenty cents per cwt. is paid in Toronto f.o.b. country points.

## A BRIEF SUMMARY OF EXPERIMENTS IN MILK AND CREAM TESTING.

R. W. Brown, O.A.C., Guelph.

Last year Mr. D. McMillan asked us to do some experimental work regarding effect on mould in samples by *not* shaking vs. shaking composite cream samples after introducing individual samples. Composite samples are shaken to facilitate the mixing of the preservative with the cream or milk.

This experiment was carried on over a period of five months, April, May, June, July and August. During this time thirty-eight separate deliveries were made. Pint milk bottles were used for the samples and the preservative was our stock mixture of three parts bichromate of potash to one part bichloride of mercury.

During the five months in which these tests were made the samples which were *not* shaken showed less mould, hence were in better condition for testing than those samples which were shaken after the introduction of each individual sample. It was found very necessary in each case to exercise care in pouring samples into the bottles so as not to leave cream adhering to the inside of the glass above the cream line. Wherever cream was allowed to remain on the sides of the bottles, there mould grew. This precaution is hardly possible when the samples are shaken.

## "Red Readers" on Cream Fat Tests.

A number of tests were made to determine the effect if any of "red readers" upon the percentage of fat in Babcock cream tests. Red Readers are used to eliminate the meniscus and facilitate the reading of tests. Amyl alcohol colored red with carbol fuchsin, and glymol colored red with alkanite root, were the readers used. In every case the use of these readers decreased the reading by one-half per cent., and in a few cases by one per cent. as compared with reading the same tests from the bottom of the meniscus before adding the red reader. By using the "reader" we reduced the reading ½ per cent. in 50 per cent. bottles.

Mr. Herns: Of the creamery men present, how many read the test to the bottom of the meniscus?

The show of hands indicated that the majority of samples are read at the bottom of the meniscus.

Mr. Brown: The color in the fat column in a nine-gram charge is usually better than that produced when an eighteen-gram charge is used.

Mr. McFeeters: Can you not gauge the amount of water to be added to get same results?

A.—Yes, but it takes more time.

Mr. Herns: Was there less mould on the composite samples when the bottles were not shaken at the time sample was added?

A.—Yes.

Mr. Robertson: Do you prefer adding preservative twice a month?

A.—It may be preferable.

Mr. Johnston: Would it not be better to test daily?

A.—It is much more work.

Q.—Is it necessary to shake the bottle to mix the preservative with the cream sample?

A.—Not necessary.

Mr. Herns: I think, perhaps, we should go careful on this question of "red reader." Although it may give us a straight line by which to read the fat column, yet at the same time it mixes with the fat very readily and a little delay in reading the tests or a shake-up of the bottles would give trouble. Let us wait until further experiments have been made to determine whether or not this is feasible to be worked under average creamery conditions.

# A BRIEF SUMMARY OF CHEESE EXPERIMENTS CONDUCTED AT THE O. A. C., 1914.

W. J. Bird, O.A.C., Guelph.

## EXPERIMENT NO. 1.

(*a*) The Effect of the Per Cent. of Acid in Whey at Dipping on the Yield, Quality and Per Cent. of Moisture in Cheese.

There were sixteen experiments made commencing April 15th, and finishing Sept. 2nd, 1914. The milk was divided into two equal lots A and B after being thoroughly mixed.

Until the time of dipping both lots were handled the same. At dipping A was taken out with a low percentage of acid in the whey. B was held till a higher percentage had developed.

Summary.

| — | (A) Low percentage acidity at dipping. | (B) High percentage acidity at dipping. |
|---|---|---|
| Lbs. of milk | 11,174 | 11,174 |
| Average per cent of fat | 3.44 | 3.44 |
| " " casein | 1.92 | 1.92 |
| " " acidity at setting | .18 | .18 |
| " " " dipping | .149 | .175 |
| " " " milling | .64 | .71 |
| " " " salting | .95 | 1.00 |
| " " fat in whey | .20 | .20 |
| Lbs. cheese per 1,000 lbs. milk | 88.03 | 86.95 |
| Lbs. milk " 1 lb. cheese | 12.27 | 12.82 |
| Total lbs. green cheese | 1003.00 | 998.64 |
| " ripe " (1 month old) | 983.71 | 971.72 |
| " shrinkage in one month | 19.29 | 26.92 |
| Average per cent. of shrinkage in one month | 1.92 | 2.69 |
| " " of moisture in green cheese | 35.43 | 34.91 |
| " " of " ripe cheese | 35.4 | 34.78 |

Average Score of Cheese.

| Vat. | Flavor. | Closeness. | Even Color. | Texture. | Finish. | Total. |
|---|---|---|---|---|---|---|
| A Low percentage of acidity at dipping. | 36.34 | 13.98 | 14.11 | 16.93 | 10 | 91.36 |
| B High percentage of acidity at dipping. | 36.34 | 14.04 | 13.85 | 16.64 | 10 | 90.87 |

It is interesting to note the difference in the cheese made at different seasons of the year.

The cheese made from the curd dipped with high percentage of acid scored a little higher for flavor during April and May, latter end of August and beginning

of September. During the hot months the cheese from this vat had an acidy flavor, and was scored down on that account. The average scores for flavor were exactly the same. The closeness of the cheese was much the same in both lots, except those made in late August and early September and dipped with low acidity showed an open texture.

The color of the cheese made from the vat with high acid at dipping during the hot months had a tendency to be "cut."

The texture of the cheese made with a high percentage of acid at dipping scored higher during the early part of the season, but lower during the hot weather. The cheese made by the two methods in the autumn did not show any marked difference in texture.

### Conclusions.

1. The yield of cheese was a little over one pound more per 1,000 lbs. milk by dipping the curd comparatively sweet.

2. The shrinkage for one month on the green cheese averaged about one-half per cent. less by having a comparatively low acidity at the time of removing the whey.

3. The curds dipped comparatively sweet had a slightly higher moisture content both when green and at the end of one month's ripening.

4. The average score of the cheese for the whole season was slightly in favor of the sweet-dipped curds, but there were times when this was not the case, indicating that a cheesemaker needs to exercise judgment on the acid question and vary the acidity according to season and condition of milk.

### (*b*) The Loss of Cheesemaking Material by Using Overripe Milk as Compared with Normal Milk.

There were twenty experiments made, using altogether 37,709 lbs. milk. 25,153 lbs. were used in the overripe lots and 12,556 lbs. of fairly sweet milk were used as for the control tests. The overripe milk was usually Monday morning's milk.

The experiment commenced April 20th, and finished Sept. 18th, 1914.

### Summary.

| —— | A.—Overripe. | B.—Normal. |
|---|---|---|
| Total lbs. of milk used in vats | 25,153 | 12,556 |
| Average per cent. of fat in milk | 3.32 | 3.45 |
| " " of casein in milk | 1.96 | 1.97 |
| " acidity at setting ..... per cent. | .205 | .17 |
| " No. hours and minutes in whey (cooking) | 1 hour 26 min. | 3 hours 3 min. |
| " acidity at dipping ..... per cent. | .168 | .169 |
| Total green cheese ..... lbs. | 2160.83 | 1151.17 |
| " ripe " (1 month old) ..... " | 2103.88 | 1128.63 |
| " shrinkage ..... " | 56.95 | 22.54 |
| Average " ..... per cent. | 2.63 | 1.95 |
| " cheese per 1,000 lbs. milk | 83.64 | 89.88 |
| " lbs. milk required per lb. cheese | 11.95 | 11.11 |
| " moisture in green cheese ..... per cent. | 35.12 | 34.81 |
| " " in cheese (1 month old) ..... " | 34.68 | 34.43 |
| " loss of moisture in 1 month old ..... " | .44 | .38 |
| " Percentage of milk-fat in whey at dipping | .23 | .18 |

AVERAGE SCORE OF CHEESE.

| Vat. | 40 Flavor. | 15 Closeness. | 15 Even Color. | 20 Texture. | 10 Finish. | 100 Total. |
|---|---|---|---|---|---|---|
| Over-ripe A.... | 36 | 14.1 | 14.13 | 16.75 | 10 | 90.98 |
| Normal B.... | 36.40 | 14. | 14.41 | 17.00 | 10 | 91.89 |

CONCLUSIONS.

1. The overripe lots of milk produced an average of 6.24 lbs. *less cheese* per 1,000 lbs. milk as compared with the normal lots, and emphasized the great need there is for delivering milk at the cheese factory in a sweet condition, which can be done by cooling the milk to 50 degrees to 65 degrees F. on the farm—the lower temperature being necessary for Saturday night's milk carried over to Monday morning as is the custom in most cheese districts of Ontario. To cool milk properly requires plenty of cold water, and better still, ice and water, with a suitable tank for holding cans and water. There is undoubtedly a great loss of cheesemaking material from handling overripe milk, more especially on Monday morning, when the high acidity for a comparatively long time seems to dissolve the caseous or cheesemaking material and it is lost in the whey.

2. There is also extra loss of fat in the whey from overripe milk, and greater loss in weight during the ripening or what is commonly called the "curing" of the cheese. The average shrinkage of the overripe lots of cheese during one month, was over one-half per cent. greater as compared with the normal milk lots. It was noticed that the whey from the overripe curds while in the sink after dipping tested much higher in fat than did the whey from the normal curds. On one occasion the whey from the overripe curds in the sink tested 2.3 per cent. fat.

3. There was not the great difference in the average score of the cheese which we might expect. Part of this is accounted for by the fact that one or two of the normal milk lots were off in flavor which showed in the cheese causing the average score for flavor in the two lots to differ by but .4 of a point. This emphasizes another point in milk to be used for cheesemaking—it must be not sweet, but of *good flavor*.

(*c*) RIPENING CHEESE IN COLD ROOM VS. ORDINARY ROOM.

The milk was put into one vat and made into three cheese. The "A" cheese was taken directly from the press to cool room (temp. 40 degrees-45 degrees F.) and not turned. The "B" cheese was placed in the ordinary room for one week, (temp. 60 degrees-84 degrees F.) then placed in the cool room. The "C" cheese was left in the ordinary room for one month. All cheese were weighed and tested for moisture as soon as taken from the press and at the end of one month. There were 17 experiments made using 28,436 lbs. milk, testing an average of 3.38 per cent. fat and 2.0 per cent. casein. The average per cent. of fat in the whey was .21.

AVERAGE OF RESULTS.

| — | Weight of Cheese. | | Shrinkage. | | Moisture in— | |
|---|---|---|---|---|---|---|
| | Green Cheese lbs. | Ripe Cheese lbs. | Lbs. | Per cent. | Green Cheese | Ripe Cheese. |
| | | | | | % | % |
| A.... | 664.59 | 650.36 | 14.23 | 2.15 | 35.29 | 35.05 |
| B.... | 668.47 | 646.01 | 22.46 | 3.36 | 35.29 | 34.62 |
| C.... | 769.56 | 738.82 | 30.74 | 3.99 | 35.29 | 34.46 |

AVERAGE SCORE OF CHEESE.

| — | Flavor. 40 | Closeness. 15 | Even Color. 15 | Texture. 20 | Finish. 10 | Total. 100 |
|---|---|---|---|---|---|---|
| A.... | 36.92 | 14.15 | 14.65 | 17.73 | 10 | 93.45 |
| B.... | 36.60 | 14.07 | 14.27 | 16.91 | 10 | 91.85 |
| C.... | 35.54 | 14.10 | 13.90 | 16.40 | 10 | 89.94 |

## CONCLUSIONS.

1. As in former years, the quality of cheese was superior when ripened at a temperature of 40 degrees to 45 degrees F., as compared with ripening at a higher temperature for one week, or during the whole period.

2. The loss in weight during ripening was greater when ripened at the higher temperature by about 1¼ to 1¾ per cent.

3. The green cheese of each lot averaged 35.29 per cent. moisture. During one month the A lots decreased by .24 per cent., the B lots by .67 per cent. and the C lots ripened at 60 degrees to 84 degrees F., decreased .73 per cent. moisture. The loss in moisture does not account for the entire loss in weight of the cheese during one month. Up to the present we have been unable to account for this difference. It is probably due to chemical changes in the cheese constituents.

MR. BOYES: How long from dipping to milling?

A.—About two hours.

PROF. DEAN: The experiment shows clearly the necessity for having clean milk as well as sweet milk to have good cheese.

MR. MCKENZIE: Was the per cent. of fat the same in both cases?

A.—No, but there was little difference.

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# SUMMARY OF EXPERIMENTS IN COTTAGE AND BUTTERMILK CHEESEMAKING.

MISS BELLA MILLAR, O.A.C. GUELPH.

COTTAGE CHEESE.—In order to get the best results it is necessary to pasteurize the skim-milk and add culture. Two methods were used for making the cheese, one by using heat and the other by using rennet. The rennet method was preferred as the cheese was more smooth and creamy. If using heat, lower temperatures than are usually used will give a cheese that is more soft and smooth, more like that made with rennet.

It is considered that one lb. of cheese can be made from 7 lbs. of skim-milk, but in our work with small quantities the yield averaged higher.

Buttermilk Cheese.—In making cheese from buttermilk the work was not as uniform as there were great variations in the material used, such as, sweet or ripe cream, pasteurized or raw cream.

Buttermilk from cream that was pasteurized sweet and culture added gave the best results. The flavor of the cheese from the raw cream buttermilk was not always satisfactory. Cream that was ripened or partially ripened before pasteurizing usually gave a very fine-grained curd, sometimes more like a fine chalky powder. This was partially and sometimes completely lost through the draining cloth. We tried a few experiments with lime as a neutralizer and then added rennet but the results were not satisfactory.

The new Bulletin put out by the Wisconsin Agricultural Experiment Station states that they did not find lime satisfactory; however, they published two methods which proved successful. These new methods have not, as yet, been tried by us.

Q.—Where is the market for buttermilk cheese?

Miss Miller: It is limited at present.

Q.—Would you recommend the creamery men to make buttermilk cheese?

A.—If you can find a market for it, yes.

Q.—How long will it keep?

A.—It may be kept a week under ordinary conditions, somewhat longer if kept in cold storage.

Mr. Forster: The Jews use a lot of cottage cheese and in time a good market may be worked up for it.

Prof. Dean: There is a fair market for it at Toronto but of course it is limited.

## Variations in Daily Tests of Patron's Cream.

Mr. Waddell: While we believe the daily test, or the testing of every can of cream received, is the proper way to receive cream, yet it has not given us as good satisfaction as the composite sample or monthly test on account of the variation in the test from time to time, whereas with the monthly test it was an average of a number of deliveries. Patrons could not understand why the test should vary so much from time to time. We found so many things that made a difference in the test, but chiefly the variation in speed of the machine and the machine being out of level and unevenly balanced, also so many inferior separators getting out of order and often running milk in with the cream and many times running cream out in the skim-milk. Patrons seldom make any allowance for these things but they all affect the test.

Prof. Dean: How much difference did you find in daily testing?

A.—From 20 to 30 per cent.

Mr. Herns: Have you been able to satisfy the patrons by explaining to them the causes and remedies so far as possible of these variations in the test?

A.—Yes, fairly well. We are now testing twice per month.

Mr. Forster: Do you find much difference in the tests of daily compared with monthly sampling?

A.—There is not much difference in the total fat, comparing one method with the other.

Q.—Does the haulers' sampling on the wagon correspond to actual yield of fat?

A.—In some cases, no, not exactly, but the buttermaker must do his best to keep this running straight.

Mr. Holmes: I think the first year will give you the most trouble in daily sampling and testing. Better care is taken of the cream when daily sampling is adopted. At least this has been our experience.

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## TESTING SAMPLES OF MILK AND CREAM SENT IN FROM FARMS.

Prof. H. H. Dean, O.A.C., Guelph.

The Dairy Department of the Ontario Agricultural College receives a great many samples of milk and cream from farms for testing. Many of these are sent by patrons who are dissatisfied with the test as given by the creamery owner or purchaser of milk and cream. One creameryman has suggested that the College should not test these samples without first making careful inquiry as to how the sample was taken, what the object was in sending sample, etc. We hardly think this is practicable, neither do we see that we can refuse to test samples so sent in and make a report on same, as the farmer has faith in the accuracy and fairness of the College test. It is, however, rather difficult to explain the wide difference which occurs at times between the tests as made by us, and tests made of similar cream by the creamery manager or purchaser. The same remark applies to milk samples sent us by farmers who send or bring samples which have been condemned by the Medical Health Inspector for city milk. All we can do, is to test the sample or samples sent us and assume that the sample or samples are representative.

It has been also suggested that the Dairy department prepare a circular letter calling attention to the causes of variation in the fat test of milk and cream, more particularly the latter. This we shall do for next season in order to see if this will lessen the friction which is all too apparent at the present time, as farmers, right or wrong, seem to have a strong suspicion that they are not getting "a square deal" under present conditions.

I may also mention that cream samples when tested at the Ontario Agricultural College are weighed on a sensitive, single bottle, balance, which may account for some of the difference between our tests and those given by cream buyers.

Mr. Waddell: We have had some difficulty with cream samples sent in by patrons to be tested at the Ontario Agricultural College Dairy department. The samples sent to the College in almost every case tested higher than either ours or the patron's. In one case the patron tested the sample and his test was 33 per cent. He brought the sample to the creamery and our test was 35 per cent. He then sent the sample to the College and their test was 36.5 per cent. The patron used the pipette for taking the sample, we used the scales and weighed out the sample and we presume the college tester used the scale, why this difference?

Mr. Herns: There can be no question regarding the advisability of the College testing samples of milk or cream sent in by farmers. In my opinion it is only right that they should do so. The patrons expect that the College will do this work for them and I cannot see how the College could refuse to do this testing. The only point to clear up is why such wide variations occasionally occur, and what can be done to overcome this difficulty.

Mr. Forster: I quite agree with Mr. Herns that the College should test samples sent in from time to time. I would suggest, however, that a letter be

drafted, a copy of which may be sent to each person a test of whose cream is made, this letter to cover an explanation of the causes of the variations in tests of different samples of cream and any other points which may be of value.

MR. HERNS: The suggestion regarding the letter is a good one and I would add to this that care be taken in not attempting to test samples which are out of condition, or if tests are made of such samples then it should be explained on the letter, although in my opinion it would be best not to attempt to test any samples which are not in proper condition to get a reliable sample.

MR. KEYES: In our experience, for every turn of the separator handle, less than is intended by the manufacturer makes a difference of one per cent. in the cream tests.

PROF. DEAN: Our experiments confirm Mr. Keyes' statement.

MR. HERNS: Another explanation of the difference between the sample tested by the creamery man and the sample sent to the College may be that the sample tested at the creamery is the monthly sample, which, of course, is an average of a number of different lots of cream, while the sample sent to the College may be taken from only the cream separated on the one day. Extreme variations might enter here.

MR. FAIRWEATHER: I would suggest two sets of composite sample bottles, so that the one set of samples may be kept for a week or so after the monthly statements are issued in order that a test may be made for the patron at any time if he so desires.

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## THE BEST TEMPERATURE AT WHICH TO PASTEURIZE CREAM.

H. H. DEAN, PROFESSOR OF DAIRY HUSBANDRY, O.A.C., GUELPH.

There are two systems in use among creamerymen for pasteurizing cream to be used in the manufacture of butter—the Continuous or what is sometimes called the "Flash" method, and the "Discontinuous," "Intermittent," or "Holder" plan. The temperature should be varied somewhat according to the method of heating. For the "Flash" method, a temperature of 180 degrees to 185 degrees F. is recommended. We have tried temperatures from 140 degrees F. to 200 degrees F., but have got the best all-round results at 180 degrees-185 degrees. A lower temperature of 160 degrees to 170 degrees has also given good results and the cooked flavor on the cream and butter is not so pronounced, neither does it cost so much for heating and cooling by adopting the lower temperature, but the butter from some creams does not appear to be satisfactory when the cream is heated below 180 degrees to 185 degrees F.—off flavors are more prevalent and the butter lacks keeping quality.

For the "Holder" method a lower temperature is satisfactory as the cream is held at the heating temperature for about 20 to 30 minutes: therefore, 140 degrees to 145 degrees is likely to give satisfactory results by this plan, although we shall need to conduct some further experiments on this point, as those made during the season of 1914 were not satisfactory, owing to a defective pasteurizer and cream holder.

We have found best results in pasteurizing sweet cream. The higher the acidity of the cream at the time of heating, the greater the loss of fat in the buttermilk at churning, although it is possible that by cooling to a low temperature

and churning at a low temperature, taking 50 to 60 minutes to churn, the loss of fat in buttermilk could be lessened very materially.

MR. BARR: In our experiments 171 degrees for the flash system and 140 degrees for the holder system gave us favorable results.

MR. BARBER: We have a beaver vat and pasteurize at 140 to 145 degrees and hold about ½ hour and get good results.

MR. STRATTON: We have a Wizard Vat and we find excessive fat loss in cream with high acidity. We pasteurize in the afternoon and churn the following morning. Churn as low as 50 degrees. We do not like to have butter come in much less than 45 minutes to one hour.

MR. SMITH: It would be well to have cream in a condition that it will not churn in less time than one hour to keep down fat loss. Cream cooled low enough and kept cold long enough to churn in one hour will hold down the fat loss very well.

MR. BROWN: In a number of trials at the College when churning was delayed not longer than one hour we got the lowest fat loss.

MR. HERNS: One of the difficulties at some of the creameries during the warm months is that the cream is not held long enough at churning temperature. That is, the methods of cooling are too slow and the cream does not reach churning temperature at least five hours before the churning is started. This accounts for a lot of slushy butter and heavy loss of fat in the buttermilk. We must get more up-to-date arrangements for quick cooling of the cream if we are to be successful in controlling the fat loss in the buttermilk.

## IMPROVING QUALITY OF BUTTER.

MACK ROBERTSON, BELLEVILLE.

About four years ago when attending this meeting I remember a gentleman being here who used to be prominent in Ontario creamery work as long as fifteen years ago. In talking with this gentleman, he said, "Well, there is nothing new in creamery work, you have just discussed the same old questions that we discussed ten or twelve years ago." When this gentleman told me this I knew he was proving his relationship to Ananias because we had discussed subjects at that meeting which he had never heard of.

In making an attempt to bring forward some suggestions to improve the quality of Ontario butter, one is inclined to wonder what really is new. There may not be much new that could be used to improve the quality of our butter, but there are a few old schemes which are certainly not worn out with too much practice.

Some of these old schemes which are so little practised may be enumerated as follows: Grading cream, Paying according to grade and Pasteurizing. These three I believe are the most important and the least practised. They are splendid ideas; but like the dairy cow they are unprofitable unless they are milked regularly.

Grading cream: some creameries are in a position to refuse poor cream. Where this is possible I believe it is better than grading. There are other creameries, however, which cannot refuse the cream. Before it is seen by any official of the creamery it has travelled fifty or sixty miles by rail and it cannot very well be returned; although in our own business we did return four or five cans this summer. For creameries in general, I believe that the grading of cream will be

their salvation. What encouragement has a man to take care of his cream when he knows his slovenly neighbor is going to get as much money for his poor cream as the good cream man gets for his.

How is this cream grading system to be inaugurated in Ontario? As creamery men we have been told that grading would pay. We have been told in two different ways: Some packages of butter from Alberta, sent to our National Exhibition have told us. These packages of butter have told us not in words, but in deeds. They demonstrated to us in a practical way. Again some government officials have told us that grading would pay. Unlike the Alberta butter, however, they have told us only in words—not in deeds. It is deeds and action we want. Why has Alberta and Saskatchewan adopted grading? Is it because they had a Marker and a Wilson? We believe we have just as good men as those aforementioned gentlemen. The trouble is we have too many markers, that is, men who are marking time, insofar as cream grading is concerned. We want a leader in this matter, and believe that this leader should be a government official with the necessary power and will to act.

Just another point about grading. To be efficient, it must be honest. Paying one cent more in a certain territory, simply to keep pace with another creamerymman's price is not cream grading; it is cream degrading. This is where a government official could expose the perpetrator of the crime. It is a crime, even though it at present is not a criminal offence.

Paying according to grade: very little need be said about this. Personally I believe two grades would be sufficient to have the desired result. If a patron loses three cents per pound butter fat because he sent poor cream, I believe it would have the desired result. When you touch a man's pocket, you touch the most sensitive member of his nervous system.

Pasteurization: If a creamery man does not pasteurize, it must be because of lack of water, lack of the necessary funds to buy machinery, or because he does not know any better.

The time is not coming, it is here, when Ontario creamerymen must put forth their best efforts. Consumers are demanding "real butter."

Statements were made to the effect that from 1 to 2 and even as much as 5c. per pound of fat less was paid for inferior cream.

Q.—What standard do you recommend for fat?

MR. HERNS: We advocate from 30 to 35 per cent.

MR. HERNS: I would suggest that the creamery men keep a note of the patrons who continually deliver inferior cream. Then at the time of the creamery instructor's visit, have him go out to these men and see if it is not possible to persuade them to change their methods. I am sure the creamery instructors will exercise good judgment in this connection and will not do the patrons any harm. A letter might be drafted covering these conditions which would take any onus off the creamery men.

MR. WADDELL: I give Mr. Herns a standing invitation to have the creamery instructors visit our 1,200 patrons next year.

MR. MCLEAN: Creamery men should have no objections to the instructor visiting the patron.

MR. O'FLYNN: How long can cream be kept and keep it right?

A.—A few days.

Q.—After grading cream would you churn all grades together?

MR. MCLEAN: No, not if you have enough to churn separate.

Mr. Herns: I believe we are getting closer to cream grading than ever before and we hope to have some plan worked out in the near future that will apply to Western Ontario conditions. Let us make a special effort to get more uniformity in salting.

Mr. Muir: Less salt and more uniformity would improve the quality of Western Ontario butter very materially. It is very difficult to get a carload of butter in which at least some of the churnings are not too highly salted.

Mr. Barr: We found more uniformity in the salt when we churned in the old box churn. I would suggest the weighing and testing of each vat of cream.

Mr. Forster: I would suggest that the Department send out a special letter to all creamery men impressing them with the importance of uniformity in salting.

Mr. Muir: I think about 3 per cent. of salt is quite sufficient.

Mr. Herns: 3.2 per cent. was the average per cent. of salt in the finished butter in Western Ontario last year as indicated by the tests made from time to time by the creamery instructors during their visit to the creamery.

Mr. Waddell: We used 5 per cent. salt on the butter.

Mr. McLean: We find a growing tendency towards milder salted butter in trade.

Mr. Herns: Would it not be a good plan if the experimental work which is conducted at our dairy schools and experiment stations could be put into bulletin form, eliminating all unnecessary figures and tables, making the matter a summary as far as possible of the work done each year; a sort of Dairy Gazette if you like. Nearly all the experiments conducted along dairy lines are for the benefit of the cheese and buttermakers, and yet a big percentage of the most valuable work does not reach those for whom it is intended in a compact form separate from other material and also in such shape that it may be filed for easy reference. With the co-operation of the two Dairymen's Associations, I believe it possible to arrange this experimental material in such a way that it will appeal more strongly to the makers. This of course, is only a suggestion on my part.

A. E. Gracey: If all the recommendations and suggestions, given by our leading dairy lights were carried out, little room would be left to improve the quality of our dairy produce. Many of these scientific recommendations may be difficult to carry out fully in actual practice. Unfortunately many could be acted upon that practically are overlooked or disregarded by our dairymen, producers, manufacturers and dealers.

What a fine line of goods we might have if the producers sent nothing but the cleanest milk to our factories. Our manufacturers handling this milk, in the most sanitary and scientific manner, our dealers holding the finished product in clean, properly equipped cold storages, until the product reached the proper degree of ripening. All working together for the common good of all concerned.

What do we actually find in Ontario? Every hot spell of weather we find quite too large a percentage of overripe and tainted milk coming to our factory weigh-stands and our makers unable to return only the worst of this under standard milk, at the best many makers afraid almost to do this. This milk goes in with the best milk and lowers the standard of the day's make of cheese. Knowing the quality of these goods there is a hurry all around to get rid of this undesirable stuff and it is put on the market unclean in flavor, rough and uncured in texture. Not much wonder that it is so difficult to work up a "home market" for Cheddar cheese.

Now what can we do to improve these conditions as we actually find them? I have so often noticed that the competitors of our cheese factories, the condensers, city dairies, and powdered milk plants as a rule get a much higher percentage of clean milk than do our factories. Why? Because they set a standard which must be lived up to or the producer is told his milk is not wanted. This is well known by every patron sending to these institutions, and no very serious complaints are ever heard of.

We have in our cheese factories many patrons taking good care of their milk supply, cooling after milking, paying some attention to the cleanliness of, not only the milking, but to all utensils connected with the business, and more of these kind of patrons are noticeable every year. Yet we still have to contend with the careless "don't-care-a-cent" independent patron who comes along with or without an excuse that his milk passed in with the good milk of the good patron and lowers the standard of the whole.

How long would any other business stand under this strain? What can we do? What can the instructors do?

This last year we introduced the milk sediment test to our factory men and patrons, and in our opinion it is one of the things to improve the quality of the milk, for each patron can then see for himself the dirt (visible) not only in his own supply but in his neighbour's. This need offend nobody as each "button" is unknown to any one of the other patrons. Might I suggest again in his own, that a standard temperature be placed, like our other institutions are doing, for the delivery of milk at our factories. We have patrons trying to do this to a more or less extent and in these places I have noticed the greatest progress in improving the milk supply.

Our makers could do much more than any one else by eternally preaching and doing "progress" on the weigh-stand.

Might I offer a few suggestions to our makers without offending them? This may be a bit personal.

A number of our makers go up into the weigh window dressed in unsuitable clothing or allow their helper to do so. Some even smoke. Why cannot our makers put on a clean apron, for appearances' sake, if nothing else, while on the platform. This will have a pleasing effect on the patrons and on any person connected with the business.

Let me sum up by saying:

Have a standard.

Let every factory have a Babcock tester and use it on every sample of milk at least once a month and *let it be known you do.*

Have a sediment tester, use it twice a month, number the buttons or disks and make it public to the patrons every time. Work cleanly. Be clean, and preach cleanliness always to your patrons.

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## SUGGESTIONS FOR IMPROVING QUALITY OF CHEESE.

R. A. Thompson.

After all that has been said about cleanliness and the necessity for it in the manufacture of cheese, there are still a few who seem to pay very little attention to keeping their factory and utensils in a clean condition. Therefore, I would emphasize the necessity of absolute cleanliness in every detail of the process.

also the the importance of lower temperature in the preserving of milk and curing cheese, and that the cheese factory and surroundings should present a more attractive appearance so that its patrons could point to it with pride.

These are three vital points which can be applied to a number of factories and should receive the consideration of all interested in the welfare of cheese-making.

GEO. M. MCKENZIE: There are a few points I might mention which, to my mind, are important and the first is the raw material and that can only be done where the maker demands better milk at the weigh-porch. Along with the help of the instructors, good work can be done along that line. Then if the buyers would inspect the cheese in the curing rooms at least once a month it would have a good effect. Of course that is the buyers' end of it. Many of the curing rooms do not see a buyer the whole year and it has a tendency to make the cheesemaker careless. There is no part of cheesemaking which is not important, but it is difficult to make some makers believe this and may say that applies more to the latter part of the season, things are let go. May say that I called at 8 or 9 factories with Mr. Muir during the first of last week and we found a few of the factories where there was little or no fire and the cheese were cold and stiff and not curing. Our curing rooms need heat and moisture at this season where late cheese are made.

T. F. BOYES: I believe much improvement can be made in the milk supply sent to our cheese factories. While many of the patrons send milk properly cooled, yet there is still a large percentage that give it little or no care. During the past years a large portion of the milk has contained a lot of sediment.

This year by the use of the milk sediment tester we have been able to locate the large percentage of patrons sending milk of this kind.

By the use of the curd test this past season we find milk containing a great deal of sediment in most cases detrimental to our cheese.

Milk is delivered to our cheese factories at a temperature of about 78 degrees in the summer season, this temperature is very favorable for the growth of undesirable bacteria.

If we were able to have all milk drawn from the cows in a thoroughly clean condition and then immediately cooled to 65 degrees and so held till delivered to our cheese factories, we would have a great improvement in the quality of our cheese, especially in the summer season.

GEORGE TRAVIS: To improve the quality of milk for cheese factories, it requires that all patrons should furnish milk that has been properly cared for by way of cleanliness and cooling. A large percentage of patrons do care for their milk as it should be, but others do not give it any care at all, hence the whole vat is only second-rate milk. At some of the factories there is a marked improvement, at others the progress is slow, and there does not seem to be any improvement. This, of course, is largely due to the fact that the maker takes in most any kind of milk. Where this is the case the progress toward getting a better quality of milk will be slow. Just as soon as the makers will stand pat for a better quality the sooner they will get it.

## THE MILK SEDIMENT TEST FOR CHEESE FACTORY MILK.

Geo. Travis.

My little experience with the sediment test has been valuable, I think. To many patrons it has been the means of showing them exactly what is in the milk, hence in the future they tried to send cleaner milk. Possibly cleanliness is not the whole thing, but it goes a long way towards improving the quality. Impure air, we know, will contaminate milk. So, no doubt, the little particles of dirt which fall into the milk and become steeped (as it were) must certainly act as an impure culture and greatly assist in controlling the flavor. I made a few curd tests from milk containing a large amount of sediment and found in nearly every case traces of impure flavors. Just what name these flavors should have would be impossible to describe, as there were possibly twenty or more different species of dirt visible in the sample, the flavor could only be described as impure.

The sediment test, I believe, may be the means of pointing out to many of us the results of not properly cooling the milk and the effect of this on the cheese.

When the milk is not properly cooled the sediment test will show countless little particles of white specks or curd. This curd or coagulated milk, caused by the milk remaining at a high temperature, during the night, to my mind, is the greatest cause of the poor yields which we have during the warm weather.

I did a few curd tests from milk containing these little particles of curd and compared them with better milk, or milk that had no specks, and found that the latter sample gave a greater production of curd.

I cannot make the above statement as facts, because the only means that I had for making these comparisons were to take the same amount of milk as near as I could and compare the bulk of curd made from each test. The difference seemed to be discernible to the eye. To get at the real facts, I suppose the milk should be weighed in each case, tests for fat and all the detail in connection with it taken into account. However, I believe there is a lesson to be learned along this line, and in due time I believe we will be able to impress upon the minds of patrons the necessity of keeping the milk clean and cool by showing them, by the sediment test, that which is visible to the eye, and by this means we will be better able to explain to them the real value of clean, cool milk for cheese-making.

See also address on "Milk Sediment Test" given at Peterboro Convention, printed elsewhere in the Report of Dairymen's Association.

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## CONCLUSIONS re CREAM COOLING EXPERIMENTS.

D. McMillan.

Where cream was heated to 185 degrees and one cooler used with either brine or ice water we found that it required considerable work and such a large amount of ice to cool cream to churning temperature that this method of cooling cream is so far from being practical that it is out of the question. But where two coolers were used and cold water run through the first one, then brine or ice water used in the second, we found that we were able to cool cream with less ice and less loss of fat in the buttermilk than where water was used in one cooler and the cooling finished with ice and water around the vat.

## VISITING CREAMERY PATRONS.

MR. MCMILLAN.

As to visiting creamery patrons, I think (as stated by Mr. Herns) if the creamery man would make out a list of his patrons sending poor cream, also cream below a certain per cent. of fat, then arrange to have the instructor visit them, also have a letter drafted to cover these cases and sent out by the Department, it may help to take the blame off the creamery man for sending out the instructor, because I know that quite a number of creamery men object to sending out anyone to visit a few of their patrons, as this leads the patron to believe that he is not as good as his neighbor. I cannot see why this should be, yet I believe it is the case just the same. If we could work out some plan where the creamery men would be kept in the background I think visiting work would be more successful. When I go out with a cream hauler I try to impress on the patron that I am there because I wanted to go out into the country and see conditions on the farms, and that I have no more to do with the creamery than any of the other creameries in the group. If we can get the patrons to take better care of, also skim a richer cream, it will no doubt help some buttermakers to make better butter. But then we come to the creamery men who gather cream once in four or five days and in some cases once a week. Others, again, have no equipment for cooling the cream properly at the creamery. In fact, I know of some cases where there was no attempt made to cool the cream until the next day. As to the shippers, there was a time when they had to ship their cream on the first train in the morning, but now they are allowed to ship at any time, in fact some cans of cream remain at the express over night. I think there will have to be some change in this method before the quality will improve.

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## IMPORTANCE, AND COST OF HARVESTING THE ICE CROP.

H. H. DEAN, PROFESSOR OF DAIRY HUSBANDRY, O.A.C., GUELPH.

The ice crop is a very important one on Ontario dairy farms. It comes at a time of year when farmers and teams are not busy, and no crop which a dairy farmer has is so valuable in assisting to produce a good quality of milk and butter on the farm, or in securing an improved raw material for the cheese and butter manufacturer. On nearly every farm of the Province a crop of ice could be secured by damming a stream or excavating for a pond in some convenient and out-of-the-way place.

Generally speaking, we should say that at least one ton of ice per cow should be stored for cooling cream, and from two to five tons per cow for cooling milk and for a house refrigerator, which is a great convenience on the farm and will save the women many steps.

A ton of ice will require about 35 cubic feet of space, but, in building an ice-house, it is better to calculate on 40 cubic feet per ton, to allow for packing and waste. An ice-house to hold 20 to 25 tons of ice should have about 800 to 1,000 cubic feet of space. So long as there is drainage under the ice, protection from sun and rain, and insulation by the use of sawdust from hot air, the ice will keep in almost any sort of building.

The cost of harvesting ice depends upon the distance for hauling, cost of cutting, price of sawdust, etc., but, on the average, should not be over one dollar per ton. On many farms there need be no cash outlay at all, as ice and sawdust can be got free.

# REPORTS OF THE DAIRY SCHOOLS, 1914-15

## DAIRY SCHOOL, ONTARIO AGRICULTURAL COLLEGE, 1915.

G. C. Creelman, B.S.A., M.S., LL.D., *President.*

Staff of Lecturers, Demonstrators and Instructors.

H. H. Dean, B.S.A. ..... Professor of Dairy Husbandry.
R. Harcourt, B.S.A. ..... Professor of Dairy Chemistry.
A. L. Gibson, B.S.A. ..... Demonstrator in Dairy Chemistry.
D. H. Jones, B.S.A. ..... Professor of Dairy Bacteriology.
T. H. Lund, B.S.A. ..... Demonstrator of Dairy Bacteriology.
T. J. McKinney ..... Instructor in Cheesemaking.
G. Travis ..... Instructor in Cream Separators, Piping, Soldering, etc.
R. W. Brown, B.S.A. ..... Instructor in Milk and Cream Testing.
D. McMillan ..... Instructor in Buttermaking and Ice Cream Manufacture.
Miss Belle Millar ..... Instructress in Farm Buttermaking, Home and Fancy Cheesemaking, Farm Dairy.
J. B. Smith ..... Instructor in Milk and Cream Testing and Hand Separators, Farm Dairy.

The following short courses in dairying were held at the Ontario Agricultural College, Guelph, during the season of 1915.

| | No. Registered |
|---|---|
| Twelve weeks' course for Cheese and Butter Makers and Farm Dairymen | 61 |
| One week's course for Farm Cow-testing and Official Cow-testers | 43 |
| One week's course for Ice Cream Manufacturers | 14 |
| One week's course for Western Ontario Dairy Instructors | 10 |
| Total Registration | 128 |

These three weeks of Short Courses are busy ones in the Dairy Department of the College. We are very much cramped for room in the present dairy buildings not only for our short course classes but for the regular students of the College.

The work comprises: Lectures and Practical Work in the manufacture of cheese and butter on the Factory and Farm Dairy systems, including soft cheese making; the running of hand and power cream separators; testing milk and cream, and dairy by-products, judging dairy cattle, laboratory work in dairy Bacteriology and dairy Chemistry.

These Courses have been held each year since 1893, and the interest continues as great as ever. The reason is that dairying is one of the main features of Ontario agriculture. In no line of farming in this Province are the returns so certain and so great for labor and capital invested as is the case with dairying. The dairy cow makes returns twice a day, for ten or eleven months of each year. Her product is usually sold for cash, hence this class of farming tends to promote thrift and sound economy among all those who have to do with the dairy business.

H. H. Dean.

*Professor of Dairy Husbandry.*

# EASTERN DAIRY SCHOOL, KINGSTON, 1915.

## OFFICERS AND STAFF.

*Director.*—G. A. Putnam, B.S.A., Toronto.
*Superintendent.*—L. A. Zufelt, Kingston.

*Staff of Lecturers and Instructors.*

| | |
|---|---|
| L. A. Zufelt | Dairy Lectures. |
| W. T. Connell, M.D. | Professor of Dairy Bacteriology. |
| W. O. Walker, M.A. | Professor of Dairy Chemistry. |
| J. H. Echlin | Instructor in Cheesemaking. |
| W. G. Gardiner | Assistant in Cheesemaking. |
| R. E. Elliott | Instructor in Buttermaking. |
| S. S. Cheetham | Assistant in Buttermaking. |
| J. Buro | Instructor in Separators. |
| D. J. Cameron | Instructor in Milk-testing. |
| J. A. Craig | Engineer. |
| Ethel Lake | Office Assistant. |

The attendance at the School for the session of 1915 was as follows:

| | |
|---|---|
| Eleven weeks' course for Cheese and Buttermakers | 49 |
| One week's course for Eastern Dairy Instructors | 21 |
| Total | 70 |

Of the seventeen students who wrote on the final examinations, fifteen were successful. One did not secure the required number of marks on one subject and will be required to write on this again, and one failed.

The nature of the work taken up with the students varies but little from year to year, except in so far as is necessary to keep in touch with any new ideas or methods which may be of benefit to the Dairy Industry. Briefly an endeavor is made to give each student a thorough grounding in the principles underlying cheese and buttermaking so that they may do their work more intelligently. Milk, the raw material from which all dairy products are produced, is discussed at length, as it is realized that in order to produce the highest possible grade in the finished product, we must have a thorough knowledge of the raw material from which it is made. In a word, our students are taught the reason "why?" and no theory is accepted that is not capable of being put to practical application.

For demonstration purposes, upwards of 75,000 pounds of milk and 55,000 pounds of cream were manufactured into cheese and butter respectively.

During the balance of the year the School is operated as a creamery for the benefit of the dairymen in its immediate vicinity. This arrangement is found very satisfactory as it ensures an adequate supply of milk and cream for the School term.

### SUMMARY OF THE LAST YEAR'S CREAMERY OPERATIONS.

| | |
|---|---|
| Total lbs. of butter made for the year ending December 31st, 1914 | 130,400 |
| Total amount received for the sale of same | $35,785 06 |
| Total sales of cream | 1,055 94 |
| Total sales of buttermilk | 455 35 |
| Percent. of over-run | 20.5 |
| Average selling price per pound of butter | 27.44c. |
| Average price per pound of fat to patrons | 30.55c. |

L. A. Zufelt,
*Superintendent.*

Government
Publications